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The International Journal of ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY

MARTIN DEWEY, D.D.S., M.D.
Editor-in-Chief

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ORIGINAL ARTICLES

A CONSIDERATION OF BITE-PLANES IN ORTHODONTIA*

By V. H. Jackson, M.A., M.D., D.D.S., F.A.C.D., New York, N. Y.

ON RECEIVING the invitation to meet with you today it occurred to me that as I was making a constant study of abnormal and normal dental arches, noting particularly the changes that take place in their development, especially the changes in the mandible, as force is applied for that purpose in equalizing the arches, etc., that it would be well to present and review with you, some of the various phases of the subject.

A great day is dawning in the science of orthodontia, and you, gentlemen, have chosen for your life work a great specialty not only of dentistry but a *specialty of medicine.* Our duty and responsibilities to humanity are exacting. The teeth are the mill that crushes, prepares and mixes the food with saliva, which is the first step in the process of digestion and any improvement in the occlusion of the teeth that can be brought about by our orthodontic treatment for that purpose would be of inestimable value to the patient.

The teeth are distinct in their importance in all plans of animal nutrition.

Again, orthodontic treatment is necessary as it is professionally acknowledged that between thirty and forty per cent of children suffer in some degree with nasal stenosis from some cause, as from hereditary lack of development of the organs; or, it may be from a general systemic, or acquired condition. The swelling of some of the glands in "Waldeyer's Ring," or of the lymphatic tissue, clogs the nasal aperture, thus diminishing the breathing capacity, which instinctively brings the muscles into action for the purpose o[f] improving the breathing capacity, but the congestion most generally furthe[r] persists, gradually causing the habit of mouth breathing. Through this th[e] maxillary and mandibular arches are separated. Their further separation

*Read at the Meeting of the Alumni Society of the Dewey School of Orthodontia, Atlantic C[ity], April 25-26, 1921.

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mouth breathing puts other muscles on the stretch, which through their natural tonicity usually cause the maxillary arch to become narrowed and assume what is known as a V-shaped arch and, from this same influence the mandibular arch also is narrowed, often resting in posterior occlusion, with the incisors antagonizing with the gum back of the maxillary incisors.

The laryngologist and rhinologist specializing in the treatment of faucial and nasal conditions, which require the increase of space for free nasal breathing, are often led to surgically remove some of the tissues that should remain, if it be possible to keep the particular tissue in normal health without the operation. Many of these forms of treatment have proved unsuccessful in the long run.

The presence of adenoid tissue is normal, but when it becomes inflamed and swollen, as from the forced restriction of air currents in breathing, it clogs the nasal or pharyngeal space and interferes with respiration. The congestion of these tissues, as with other body tissue, results from the initial irritation, which in such cases is generally caused, it is thought, by the strained force of the air through the restricted areas of the air passages.

Generally Nature is helpless in improving these conditions and there seems to be no hope that through natural advancing development of the air channels the space will become sufficient. The orthodontist through his experience recommends early treatment and often increases the nasal space by orthopedic movement of some of the bony framework. The early treatment for this special purpose is essential, as one should operate while the bone is in its most developmental stage and before the dome of the arch encroaches too much upon the nasal space.

The roof of the mouth is the floor of the nose. The practical method of increasing nasal space to bring about a permanent normal condition of the framework and soft tissues of the maxillary and nasal region is to expand laterally the maxillary arch early in life while these bones are in their most developmental and receptive stage. With this knowledge it is intended that the orthodontist, through treatment, should assist Nature in increasing the nasal space when necessary and at the same time improve the occlusion of the teeth, as by the early lateral expansion of the dental arches. In fact, it is Nature's plan that, by the time the child is twelve years of age, his maxillary arch in front of and including the second permanent molars should be established and be as broad as this part of the adult arch is intended to be.

In conveying these ideas to the parents, as is our duty, we should speak of the *permanent teeth* as *adult* teeth and it is even more impressive to the parent when speaking of the child's permanent teeth, that we speak of them as a man's or a woman's teeth, located in the child's dental arch.

We should impress it upon the mind of the parent that the permanent teeth when erupted are as large as they ever will be and that it is Nature's intention that the arch should be broad enough to properly accommodate the permanent teeth in good line at the early age when the teeth are erupting, in fact, at this time establishing an adult arch in a child's mouth. In a large percentage of cases, through heredity, constitutional conditions, or the ordi-

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nary habits of life or environment, the dental arches do not naturally become broad enough or develop sufficiently in their lateral or anterior dimensions to normally accommodate the permanent teeth without orthodontic assistance.

In a certain number of cases the mandible may be prognathus, with the incisors resting in front of the maxillary teeth, in some instances even antagonizing with the gum, causing irritation or congestion. On the other hand, in a large percentage of cases of disturbed breathing, the patient has a receding mandible. The occlusion of the teeth accompanying either of these conditions is imperfect and permanently detrimental as first by the mandibular incisors resting in front of the maxillary incisors or, second the incisors occluding too far back of them, with the resulting expression of a too prominent or a receding mandible. With either of these conditions the facial line is imperfect and significant of these deformities.

In cases of posterior occlusion of the mandibular arch, the incisor teeth and canines with their sockets usually rest higher than normal in the occlusal plane and often antagonize more or less with the gum back of the maxillary incisors, the mandible not being well developed. The mandibular incisors,

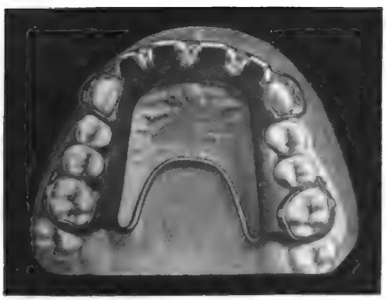

Fig. 1.

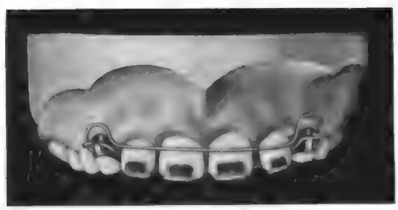

Fig. 2.

however, may antagonize with the gum back of the maxillary incisors even when there is normal occlusion of the lateral divisions of the arches.

The plan of procedure for the correction of either of these conditions and for relieving the excessive lap in case of overbite generally requires the depression of both the maxillary and mandibular incisors in some manner and the equalization of the arches. An appliance for these purposes is constructed with a flat lingual shelf attached to the arms of a regulating appliance. The appliance is usually anchored to the molars and to the canines, the shelf-like palatal projection being close back of the maxillary incisors and so shaped that all the occlusal force of the mandibular incisors and canines rests upon the shelf in occlusion, causing an open bite and preventing all other maxillary and mandibular teeth from occluding.

Fig. 1 illustrates such an appliance fitted to a maxillary arch. When necessary to depress all of the incisors or individual incisors to the front edge of the lingual shelf is attached back of each of the incisors to be depressed, a thin strip of 28-gauge plate metal usually three to four millimeters wide. Each projecting strip of metal is fitted to the lingual surface of the incisor, and shaped to pass over the incisive edge in the form of a hook and to lap in

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front of the incisor as shown in Fig. 2. To each tooth requiring further depression, additional force is caused by curving more the end of the metal.

The labial semicircular spring shown in this case is not especially essential when the plate metal hooks are adjusted to each of the teeth to be depressed.

Fig. 3 illustrates a profile view of the case with posterior occlusion before treatment, requiring the depression of the incisors and equalization of the dental arches.

Fig. 4 is a front view of the case before treatment.

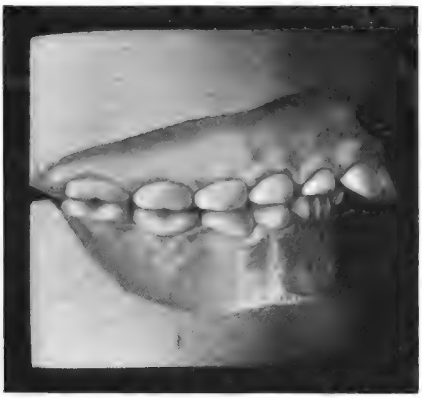

Fig. 3.

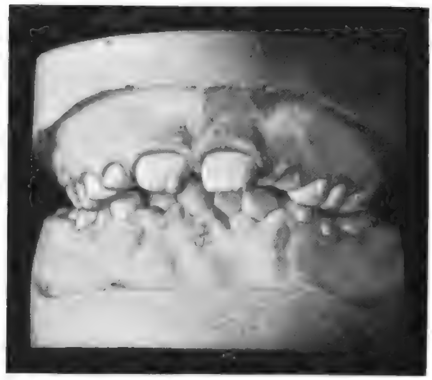

Fig. 4.

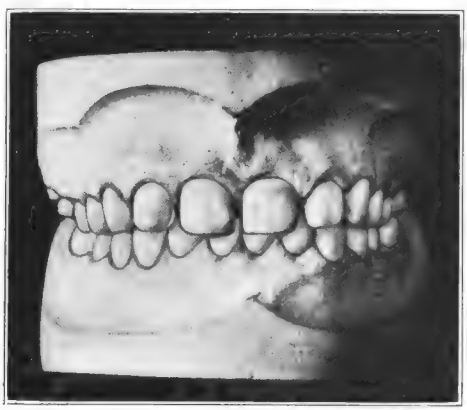

Fig. 5.

Fig. 6.

Fig. 5 shows a front view of the case after treatment with a lingual shelf and equalization of the arches.

In Fig. 6 is seen a profile view of the case after correction with anchorage collars in place.

Fig. 7 illustrates a similar appliance with a *lingual-shelf* anchored with wire clasps. The shelf is sustained to resist the occlusal force by a small looped wire shaped to pass around the tapered point of each of the upper canines and resting near their mesial and distal surfaces, with the ends of the wires extending toward the gum and passing underneath the shelf, to which

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they are soldered. This metal support on the canines resists the force in mastication without depressing the maxillary incisors. When the maxillary incisors need depressing with this form of appliance, the labial semicircular spring as described is employed. This has a loop opposite each canine with the ends of the spring passing over the arch at the junction of the canine and first premolar to be united to the appliance. The action of the spring arranged in this manner would force the incisors against the appliance, the teeth being wedge shaped, the force would cause them to become depressed with their sockets and, at the same time, the mandibular teeth would become depressed by the occlusal force on the shelf. The shelf can be either level or inclined according to the requirements.

Fig. 8 illustrates a plan of depressing maxillary and mandibular extrud-

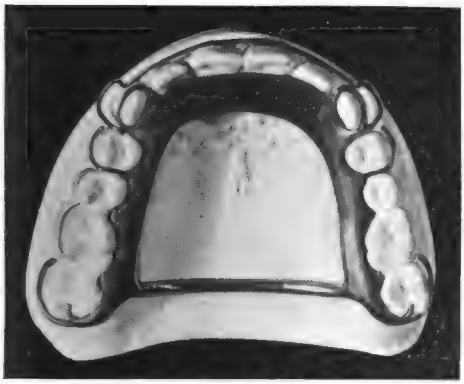

Fig. 7.

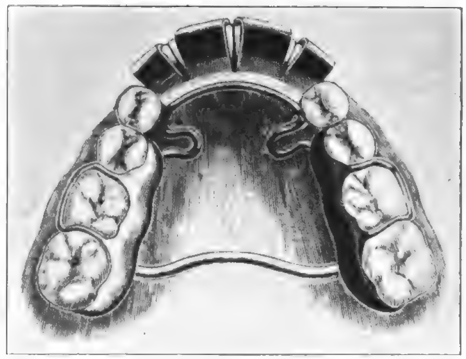

Fig. 8.

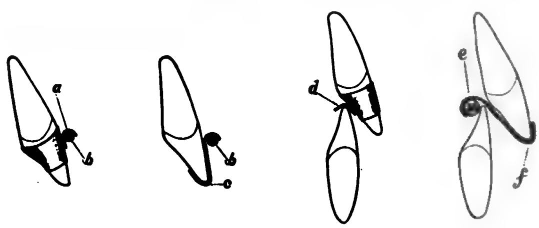

Fig. 9.

ing incisors when canines or first premolars are absent. Narrow strips of plate metal 28-gauge as described, are made hook-shaped to pass over the incisors from the lingual to the labial side and to be attached by solder to a medium sized spring wire shaped to follow the lingual curve of the arch and formed into U-shaped loops, one on either side pointing toward the median line with the free ends of the spring soldered to the lateral arms of the appliance.

With this plan it is intended that the extruding mandibular incisors should occlude in front of the lingual spring. (This is more thoroughly described in the following figure, *e*. If for any purpose more space is required, as for an erupting tooth between the premolars and incisors, the lingual loop of the appliance should be opened a little from time to time for forcing the incisors forward, thus causing space for that purpose and, at the same time depress-

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ing the teeth by curving the metal a little more at a time over the incisive edge of the incisors.

In Fig. 9, *e, f,* it will be seen that shortening the metal by bending the curved end of the hook passing over the incisive edge of the incisor, *f,* that occlusal force would cause it to rest heavier and gradually to force the incisor with its socket more deeply in the process, the changes for that purpose being made once a week or at longer intervals. The figure illustrates several other forms of apparatus for depressing both maxillary and mandibular incisors, *d* shows a collar with a lingual curved shelf cemented to a maxillary incisor, located to cause depression of the mandibular incisors in occlusion.

A plan utilized for depressing maxillary incisors shown in the next drawing is by attaching to a well-anchored maxillary appliance a labial semicircular spring *B,* with U-shaped loops located opposite the canines. For causing force an S-shaped strip of plate metal is hooked over the spring and over the incisor, *c.* The spring is adjusted as required for causing force. In place of this plan, a collar with a labial hook, when desired, can be cemented to a maxillary incisor for supporting a labial spring as shown, *ab.*

It should be understood from most all the previous descriptions that the

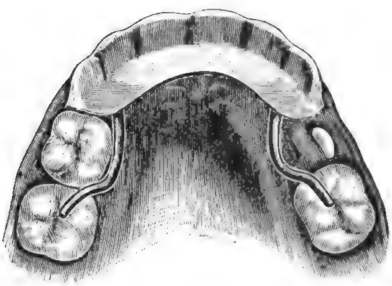

Fig. 10.

Fig. 11.

occlusal force described for causing the depression of the incisors is intermittent, as the teeth of the maxillary and mandibular arches are not in occlusion when at rest, but occlude only when one is masticating, swallowing, or when the body is under special muscular strain. Of course the intermittent force in occlusion would not cause the depression of the teeth as effectively as would be if the force were continuous.

Fig. 10 shows a plan of an appliance employed for depressing the maxillary and mandibular incisors by occlusal force and, at the same time moving the maxillary incisors inward bodily by a metal cap swaged to cover the incisors and to be cemented to them. A thick metal shelf is shaped and soldered to the lingual surface of the cap, with the shelf tipping downward and backward and two wire supports extending backward from the upper side of the shelf with the free ends resting on a molar, one on each side of the arch.

To the front part of the cap is soldered a suitable socket for the attachment of a cross bar used in connection with a cranial cap for causing force

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for the movement of the teeth inward. It will be noted that with this arrangement the palatine bars extending backward and resting on the molars hold the front teeth upright and prevent them from tipping inward as force is applied for their movement.

For these purposes, only all metal planes are now employed, but Fig. 11 illustrates the plan of a maxillary vulcanite rubber bite-plane that was used by the author many years. This one is anchored with wire clasps and spring clasps, having a labial semicircular spring with U-shaped loops opposite the canines. The object of the spring is to force the maxillary incisors against the plane when it is desired to depress them, while the mandibular incisors are being depressed through their occlusion on the plane. The plane is sometimes considerably thickened and extends downward and backward.

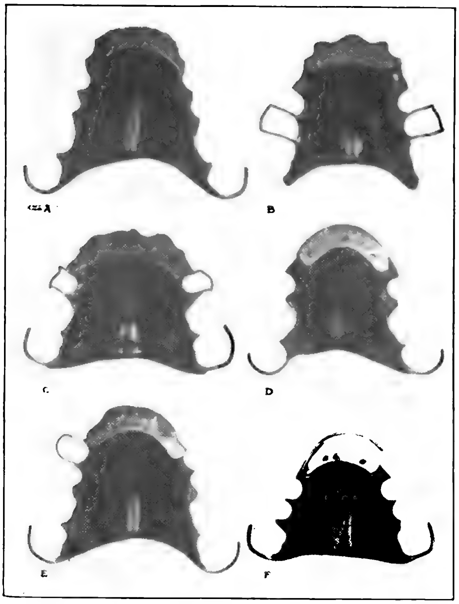

Fig. 12.

In cases of distal occlusion with the mandibular incisors and canines antagonizing with the gum back of the maxillary incisors, with all of the occlusal force being exerted on the inclined plane by these particular teeth, the tendency is to depress and cause them to slide forward on the incline, but sometimes, with this plan the teeth *wear the rubber away* causing pits which interfere with the teeth moving forward as desired.

Fig. 12 shows several forms of vulcanite bite-planes *now out of use* that were retained in a similar manner as with wire clasps and spring clasps, or by suction. To prevent the wear of the vulcanite by the teeth in occlusion pieces of plate metal covering the inclined plane or shelf were riveted to the plane as shown.

When there is sufficient incline of the distal part of a plane the force in the occlusion of the mandibular incisors and canines on the plane would force them to slide and pull forward on the mandible and in certain cases would

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cause what has been termed *"Jumping of the bite."* This force when persisted in with some cases gradually causes *a change in the angle of the mandible,* permitting that result. This principle will be further elaborated as we proceed.

Fig. 13 also illustrates a plan that has been employed for that purpose. A vulcanite plate anchored to the maxillary arch with wire clasps and spring-clasp attachments, has a metal incline extending laterally from the appliance, one resting on a distal molar on each side of the arch, the planes being steep and so arranged as to project considerably downward and pass just back of the last molars of the mandibular arch to prevent it from taking posterior occlusion.

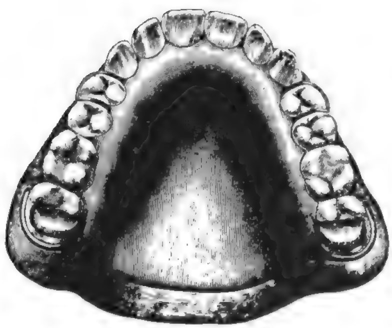

Fig. 13.

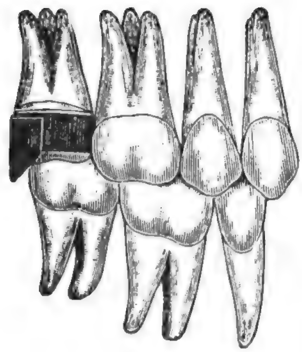

Fig. 14.

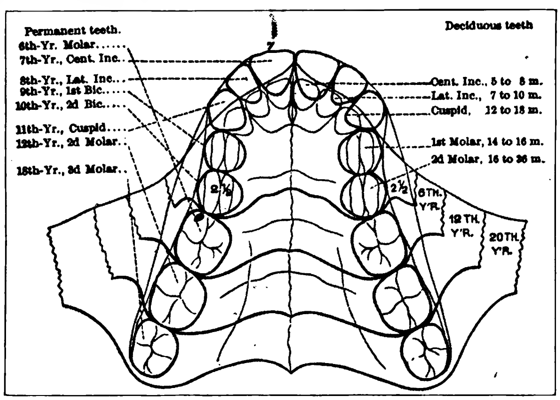

Fig. 15.—A drawing to illustrate the progressive normal development of the upper maxilla and that of the saddle and V-shaped arch, the time, and order of the eruption of the deciduous and permanent teeth, etc.

Fig. 14 shows a metal incline that has similar features to the one described for preventing posterior occlusion of the mandibular arch. A collar having a steep metal incline is cemented to each of the last maxillary molars of the arch; it is sometimes attached to two molars on each side, the incline passing back of the last mandibular molar when in occlusion.

In the study of the development of the maxillary and mandibular arches it is instructive to note the various changes that take place through their development. We will make a hasty reference to some of the characteristic changes in each, that are most important to the orthodontist.

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Fig. 15 is a diagram outlining the different recognized stages of development of normal and abnormal maxillary arches. It is intended to indicate the progressive anterior development of the maxillary arch. In each stage the arch develops forward sufficiently for the successive eruption of each of the deciduous molar teeth of the child and is followed by the time of the full development of each of the permanent or adult teeth in their regular order of eruption, as the 6th, 12th, and 20th years. All of these changes in the anterior and lateral development of the maxillary arch take place in front of the palatal bone and just in front of the pterygoid processes of the sphenoid bone.

These processes are fixed points anterior to which all development of the maxillæ takes place. These processes of the sphenoid, through lateral development, influence or govern the successive widening of the maxillary arch through each successive stage of its anterior development as indicated.

The maxillary arch is firmly *supported by the skull,* while the mandibular arch is *suspended from the skull* by ligaments and muscles.

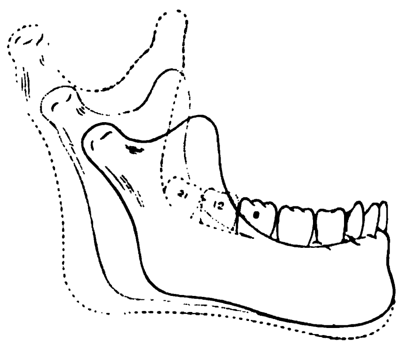

Fig. 16.

The description given in Fig. 16 of the maxillary arch illustrates Nature's remarkable plan of development of the dental arches and the erupting teeth, and singularly, the teeth in each of the maxillary and the mandibular arches appear in similar successive stages of eruption. Those of the mandibular arch appear in the same order and intervals, and usually a little before the time of the eruption of the teeth of the maxillary arch.

The illustrations picture the variations relative to the developmental correlation of each of the dental arches and teeth. Each half of the mandible is divided into an ascending *ramus, and a body,* joined at the angle. All through the stages of the progressive development of the mandible, the head of the ramus rests normally in the temporomandibular articulation. At the same time the ramus and body of the mandible are steadily developing in all of their proportions. The body is developing forward from the ramus and finally contains and supports all of the developing teeth in their different stages dating from infancy to adult life. It will be noted that each succeeding tooth erupts in the body of the mandible just in front of the ascending ramus.

A similar plan is followed through the eruption of the teeth of the maxillary arch, always in front of the fixed points of the pterygoid processes as described.

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The body is steadily developing forward from the ramus and lengthens in front of the ramus in each stage sufficiently for the normal eruption of each successive developing deciduous tooth and the succeeding permanent molars, as first the eruption of the deciduous molars, then the 1st, 2nd and 3rd permanent molars are erupted in their regular order, as in the 6th, 12th and 20th years. As stated, during all of this period the head of the ramus is resting in its temporomandibular articulation, and is progressively lengthening from above downward, increasing the length of the features, and at the same time the anteroposterior measurement and all other measurements of the body of the mandible and of the ramus are increasing in proportion to the other bones of the skull. The figure also shows the progressive development from the obtuse angle of the mandible of the child to that of the adult. This interstitial developmental condition at the angle permits a ready change to a more or less obtuse angle as desired.

Fig. 17 illustrates a model of a mandible arranged to demonstrate the changes that take place in the mandible from the application of intermaxillary force in equalizing the dental arches anteroposteriorly, as by the use

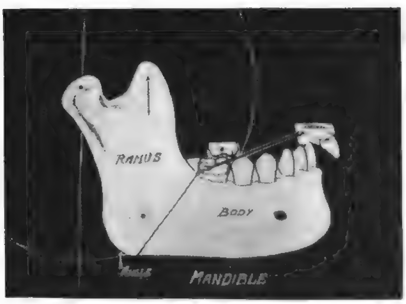

Fig. 17.

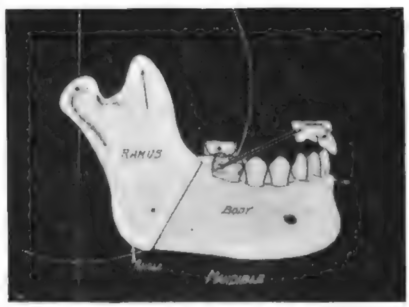

Fig. 18.

of rubber equalizing bands. An equalizing band is shown in the figure extending from the canine of the maxillary arch to the first mandibular molar for that purpose. It will be noted that the case is one of posterior occlusion with the mandibular incisors antagonizing with the gum far back of the maxillary incisors. This and the following figures are to demonstrate that the change in equalizing the dental arches from posterior occlusion to normal does not establish a new temporomandibular articulation, but that it *bends* the *mandible* at the angle, which results in causing a more obtuse position of the ramus in its relationship to the body of the mandible. This bending of the mandible for the correction of the occlusion is brought about by moderate constant force of the equalizing bands following the *laws of force*—"as a slight constant force will cause the softening of the bone, while an interrupted force, as first pressure and then relief, causes the strengthening and development of any bone." Many years ago, this principle was established by the author.

It will be noted that the first maxillary molar and the maxillary central incisor represent the maxillary arch, with the mandibular incisors antagonizing with the gum back of the maxillary incisor. The very difficult problem

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that we were discussing, represented with the bite-planes, showed that as occlusal force was applied it brought about depression of the incisors, and that with the proper incline of an occlusal plane the mandibular arch in certain cases would be forced forward to a normal occlusion through the changes at the angle of the mandible. In all of these cases as the ramus becomes more obtuse the body of the mandible takes an advanced position or becomes more prominent in its relation to the maxillary arch. This, as we have determined, is occasionally accomplished by the use of a bite-plane, but the logical method of bending downward the front part of the body of the mandible is through the process of equalizing the dental arches as shown. The forward traction on the molars acts on the lower end of the ramus while, at the same time, the *sustaining muscles* are put on the stretch in holding the condyle of the mandible in its proper position. Through these two constant forces the angle of the mandible is gradually caused to become more obtuse, which permits the teeth of the body of the mandible to rest in normal occlusion both with the molars and the incisors.

From this constant traction by the intermaxillary force the ramus is

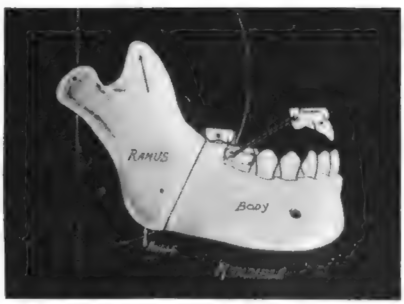

Fig. 19.

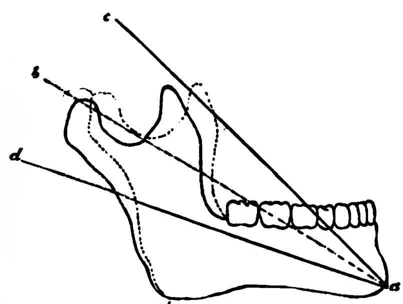

Fig. 20.

made more obtuse with the body tipped downward (Fig. 18), and it will be noted that as the body is drawn further forward with the maxillary and mandibular teeth in occlusion it cannot go to a higher level, but with the changes in the mandible the lower end of the ramus has reached a higher level and the front part of the body, with the teeth, are resting more prominently and in normal occlusion. These latter changes are what we usually seek for in the process of equalizing the dental arches.

If the same equalizing force should injudiciously be continued too long and the angle of the ramus become abnormally obtuse, as has been known to occur, the body of the mandible would become still more prominent and, by this added change of the angle, it would cause a *prognathus condition,* which might be accompanied with lack of incisal occlusion of the teeth (Fig. 19). This condition is not infrequently brought about by the *overuse* of the intermaxillary force in equalizing the arches. When this prognathus condition exists with abnormal occlusion of the teeth it is treated for correction by reversing the intermaxillary force, that is, adjusting and stretching an equalizing band from the mandibular canine to the last maxillary molar, but in true prognathism, additional force with a chin cap and cranial cap should also be employed.

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Fig. 20 illustrates the principle for the reduction of a prognathus mandible through the bending of the mandible at the angle. Intermaxillary force by the equalizing band should be applied as described and at the same time, in addition, a chin cap and a cranial cap should be employed. There are other phases of this subject that would be interesting to present.

In Fig. 21 is shown a plan of a lower device that has been used for sustaining the mandible in its new position after being reduced from a prognathus condition. The appliance has two ascending planes, one on either side of the arch, projecting upward from the crown of each of the last erupting molars, passing back of the last maxillary molars for retaining the teeth and mandible.

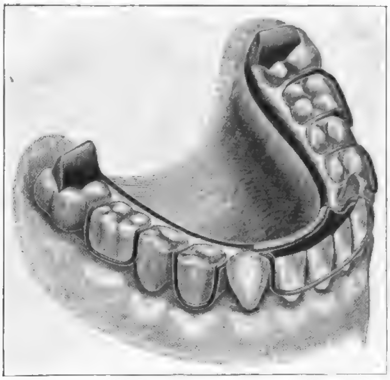

Fig. 21.

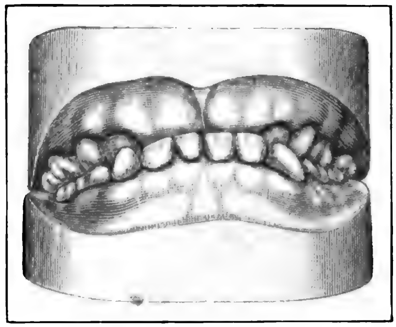

Fig. 22.

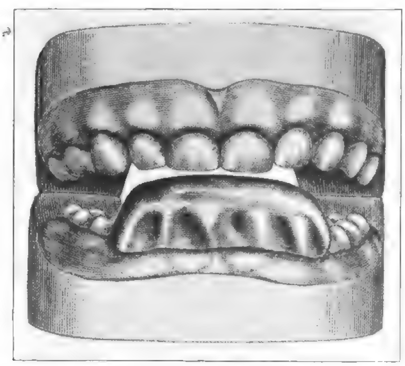

Fig. 23.

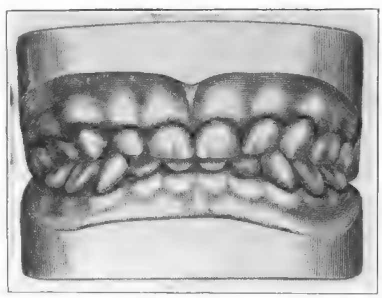

Fig. 24.

The orthodontist is utilizing to advantage the principle of the inclined plane for the depression and elevation of the teeth, the moving of the teeth to new positions, etc.

In Fig. 22 is shown the teeth of a child aged two years and ten months, with an extreme prognathus condition, the mandibular incisors resting on the gum in front of the maxillary incisors.

The case was corrected by cementing to the mandibular incisors and canines a metal cap (Fig. 23) with an incline pointing upward and backward so that in occlusion it would press against the maxillary incisors and force the mandibular arch backward. This brought about a good result in a limited time as shown in Fig. 24.

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Fig. 25 illustrates a plan for moving outward through occlusal force one or more maxillary incisors that rest in a lingual position by the use of an inclined plane. The appliance has a lingual base wire anchored to one or more of the molars on each side of the arch and to the base wire is soldered plate metal bent in the form of an inclined plane passing over the incisors.

It is especially pleasing to me on this occasion to have before us the "Consideration of Bite Planes in Orthodontia." To improve these conditions several early, thoughtful operators recognizing the necessity of improving the occlusion of the teeth, utilized and described a bite-plane for depressing the mandibular incisors with their sockets; it being especially referred to by Drs. Colignon and Barret of Paris, and by Dr. Kingsley of New York. Each of these men in comparing notes described the advantages of the maxillary plate known as a bite-plane, and Dr. Norman Kingsley, in his "Orthodontia, 1888," described and used for the purpose of depressing the incisors a rubber plate with a shelf on which the mandibular incisors would rest in occlusion. The bite-plane, as described, was worn continually for this purpose. From its use it was found, in some instances, that it not only depressed the incisors, but that the mandibular arch was moved slightly forward with a tendency toward a better occlusion of the teeth.

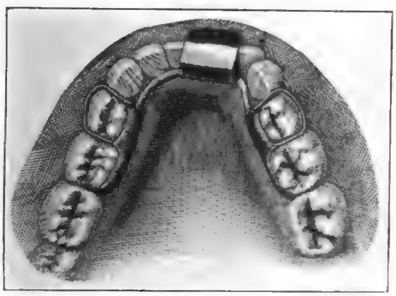

Fig. 25.

Fig. 26.

Later it was determined that if the shelf should be tipped downward and backward so that, in occlusion, the mandibular teeth would slide forward on the incline, it would draw forward on the mandibular arch in that manner, tending to still further depress the incisors and at the same time the use of the bite-plane brought about the "jumping of the bite" as Dr. Kingsley stated regarding his case.

In February, 1887, at the Academy of Medicine* in New York, at a meeting of the New York Odontological Society, Dr. E. A. Bogue, then President of the Society, presented models and described a regulating case that he saw while under treatment by Dr. Jules Colignon of Paris. It was a case having protrusion of the maxillary incisors and posterior occlusion of the mandibular arch with the incisors antagonizing with the gum back of the maxillary incisors. Dr. Bogue remarked that this case is one of the class that we read about but of which he had sought a practical illustration without success. He then read a short description of the case that Dr. Colignon had presented to him with his models, in which he stated that he was impressed with the idea that

**Cosmos,* 1887, pages 318-325.

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it was possible to drive the teeth into their alveolus or cause them to elongate, and accordingly, in April, 1886, he inserted a rubber plate covering the palatine vault, allowing only the mandibular incisors to rest on a ridge on the plate in occlusion.

The following figures were used to illustrate the case:*

Fig. 26 illustrates the maxillary protrusion and mandibular posterior occlusion.

Fig. 27 shows the V-shaped maxillary arch.

Fig. 28 illustrates the outlines of the maxillary arch improved by lateral expansion.

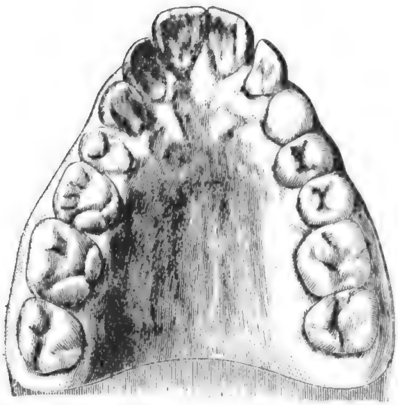

Fig. 27.

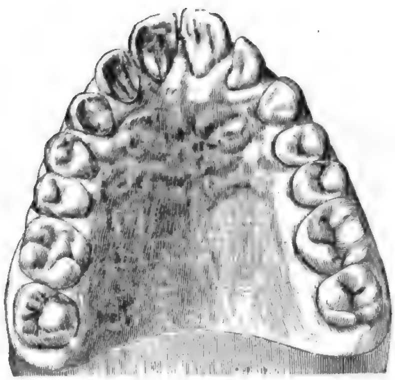

Fig. 28.

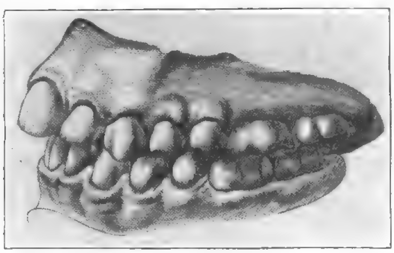

Fig. 29.

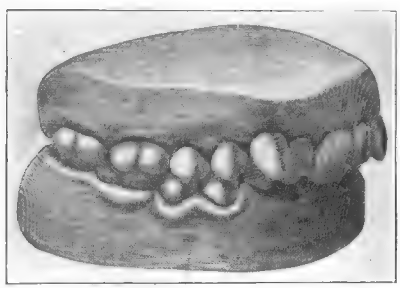

Fig. 30.

Fig. 29 shows the improved occlusion of the teeth after the jumping of the bite, leaving the teeth practically in normal occlusion.

Dr. Colignon in his letter stated that he had searched in vain to find what *jumping the bite* meant, although he had already accomplished it and the result was exceedingly gratifying. Dr. E. A. Bogue thought that the irregularity was probably caused by thumb sucking. After reading the paper, Dr. Bogue asked the members for suggestions as to how the changes were brought about and stated that the lateral expansion between the canines was caused by the use of a rubber plate, which was split from the front a little beyond the middle and separated by screws, expanding the arch about one centimeter. The plate was retained by bands on the canines.

*Cosmos, 1887, pages 318-325.

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At a later meeting of the Academy, (*Cosmos,* 1887, page 477,) Dr. Bogue, President of the Society, presented models of an orthodontic case with posterior occlusion, with a letter from Dr. W. H. Barrett of Paris, showing how Dr. Barrett corrected the case by the use of a bite-plane with which he claimed to have "jumped-the-bite."

At the time there was much discussion as to what had taken place to permit this. It would be interesting if Dr. Bogue, who is present, would tell us more of his views at that time, regarding these changes.

Fig. 30, before correction of distal occlusion.*

Fig. 31, palatal rubber plate with inclined shelf.

Fig. 32, corrected case.

This, the present day knowledge and success in equalizing the arches, has been brought about through the steady search and better understanding of the principles in connection with the changes and bending of the mandible.

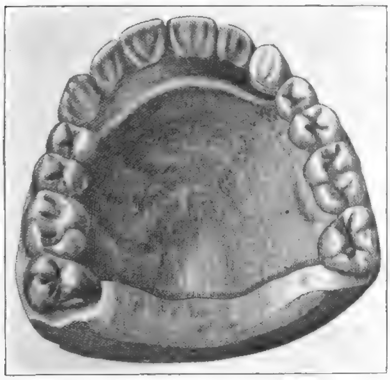

Fig. 31.

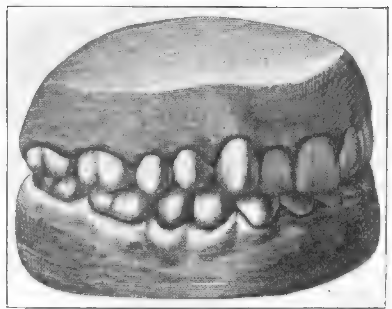

Fig. 32.

DISCUSSION

Dr. Martin Dewey, New York City.—Mr. President and Members of the Alumni Society of the Dewey School of Orthodontia: The request came to me from several sources that we have a paper presented before this Society on "Bite Planes in Orthodontia." The bite plane is one of the orthodontic applicances I have never used. However, I know Dr. Jackson has used a great many of them; that they fit with certain principles in his system of technical construction, and consequently after using considerable influence he consented to present this paper before our Society. Both Dr. Eby and I took Dr. Jackson aside and gave him some idea of what we thought the members wanted, and his paper today is an example of what Dr. Jackson understood was wanted about bite planes.

He has covered the subject from his years of experience much better than any one else could do who has been selected to discuss his paper. He has covered the subject much better than any man in this Society could do or any man who has had but 15 or 20 years of experience. If you go back and see the results of cases taken in plaster in 1887, which Dr. Jackson obtained in his own practice, it makes those of us who have been in practice ten or more years feel as if the practice of orthodontia is simply a process of evolution. Each one of us has had to contend with the same problems that the older men have solved. That to a certain extent is the history of education of every individual. The evolution of education of any one in the profession is simply the fact that we have traveled over the same ground that has been traveled over for years by those who preceded us. While it is true we can travel over the same ground more rapidly, nevertheless this paper has impressed

*Cosmos, 1887, p. 477.

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us with the fact that a lot of things discovered and presented as new are known to have been old things.

You may remember that a few years ago a certain gentleman received much notoriety by presenting a paper before five or six different societies. A great many individuals believed at that time that the ideas advanced in that paper were new. Dr. Waldron in the discussion of one of those papers presented one of the illustrations which Dr. Jackson presented here today. Dr. Waldron said the principle was used years ago by Dr. Jackson, and these facts are correct in regard to bite planes. One illustration of the condition he showed today was first described by Dr. Brady, of Kansas City, Missouri, when he and I worked together in 1910. I thought it was original with him, and the first time I heard about it was Dr. Brady's description to me, and a similar illustration appeared in my first textbook. Dr. Jackson showed it years before that time, which proves that some of the problems we are struggling with today are problems that the older men struggled with and settled to their satisfaction. Dealing mostly with changes which occur in the mandible in regard to the treatment of posterior occlusion cases, the older men have not settled them to their own satisfaction. This is proved by the fact that practically the entire program of the American Society of Orthodontists in the following days of this week is to be devoted to posterior occlusion cases. Some of the problems we are to take up before that meeting I have no doubt will be some of the things that Dr. Bogue and Dr. Jackson discussed in 1887. Those fellows in 1887 arrived at the same conclusions that will be arrived at the latter part of this week, which is another example that education moves by stages of progress, and the younger individual has to travel over the path of the older. For some reason, somehow, I do not know why, I have for a number of years held to the idea and advocated, as a great many of you well know, the changes which occur in the mandible in the treatment of posterior occlusion, are the same changes Dr. Jackson has analyzed today: namely, in treating posterior occlusion changes occur in the body of the mandible, and not in the temporomandibular articulation. There is some question as to whether a case of posterior occlusion has been permanent where changes occur in the temporomandibular articulation. We have evidence that posterior occlusion will change the temporomandibular articulation, but no evidence as to the permanent maintenance of this changed position of the condyle in the treatment of posterior occlusions, and the disto-relation of the case.

The diagrammatic illustrations which Dr. Jackson shows with his model of the mandible prompt us to ask, has he changed the body of the mandible and produced a bending in the body of the mandible? As he says, the mandibular appliance with a plane in posterior occlusion, with no overbite, eventually produces some change in the body of the mandible if the result is going to be permanent. A great many practitioners are carrying us back to the treatment of posterior occlusion cases by banding the teeth, bringing about a change in the temporomandibular articulation, which results in a lot of failures. Furthermore, that the change which takes place in the body of the mandible may be permanent is well illustrated by the paper Dr. Case presented before the American Society of Orthodontists last year under the title of "Principles of Retention."

Dr. Case had convinced himself from long experience that the forward movement of the mandible in the temporomandibular articulation was a failure. A change must occur in the body of the mandible. While he did not arrive at the same explanation as Dr. Jackson, still he accomplished the thing in another way by lengthening the dental arch by carrying the anterior teeth forward sufficiently far to lengthen the mandibular arch so as to put in an artificial substitute and make a mandible with three premolars. He has worked on the idea along another line to keep the condyle where Nature put it and bring the body of the mandible forward. Whatever plan of treatment you follow, to get a permanent result in posterior occlusion, whether you use bite planes or intermaxillary rubbers, you will change the plane of occlusion and lengthen the body of the mandible. Dr. Jackson's description did not tally with the illustration he showed because I imagine the illustration had been taken from some other work. That was the illustration where various changes occurred in the mandible from the child up to adult age, where he started to change the mandible during deciduous dentition and before the first and second molars had been added. The

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anterior portion of the mandible remained at the same point and the change which occurred appeared to be an upward and backward movement of the mandible which is an impossibility. The condyle, like the pterygoid plates, of the sphenoid bones he mentioned, are a fixed anatomical proposition. The change occurred in the mandible by downward and forward movement which carried the anterior teeth forward also, lengthening the ramus by downward growth, resulting in a condition you see in the adults who have normal occlusion.

I have been fortunate enough to find one skull in all the years I have been doing research work that showed a typical posterior occlusion, the teeth of which are present, indicating that the malocclusion has not been caused by mutilation, and the mandible is exactly the same shape as Dr. Jackson has described today. If you could take that mandible and bend it as he suggested, you could correct the posterior occlusion. In comparing that skull with all other skulls I have seen that have normal occlusion, the condyle occupied exactly the same anatomic relation.

I am deeply indebted to Dr. Jackson for showing the periods of evolutionary change in the treatment of posterior occlusions and the treatment of anterior occlusions and for disproving the old theory which a great many men have accepted. It again forcibly illustrates the fact that education is simply a progressive proposition, and that each individual has to travel over the same ground as the other men have traveled in order to gain experience.

Dr. J. W. Ford, Chicago, Ill.—I wish to pay my tribute to Dr. Jackson for his work. We are greatly indebted to him for bringing before us something which has not been previously presented. I think in the development of lingual planes or common dental planes we have to go back originally to Dr. Jackson's idea. We are coming more and more to develop the ideas Dr. Jackson has given us. All our appliances go back to the Jackson principle, consequently we orthodontists owe a great deal to him for the development of our appliances.

Dr. Victor Hugo Jackson, New York City.—As Dr. Bogue has just now entered the room, I will show again these slides of models of cases of Drs. Colignon and Barrett of Paris. Each had forwarded Dr. Bogue models with a history of his case. Each case with models was taken up for discussion at different meetings of the Odontological Society, of which Dr. Bogue was then President, and was published with illustrations as stated in the *Dental Cosmos*, 1887.

Both cases were referred to as having been corrected by the use of a *bite-plane*. We hope Dr. Bogue on seeing the slides will remember the cases and make further remarks regarding them.

We will first show the slides of the Colignon case.

The first slide represents the models showing upper protrusion and lower distal occlusion of the arches before correction.

The second slide shows the model of the V-shaped maxillary arch.

The third slide shows the model with the outlines of the maxillary arch improved with lateral expansion by a *split vulcanite plate*.

The fourth slide of the models shows the improved occlusion of the teeth after "jumping the bite," when the teeth were considered in normal occlusion.

We are now presenting three slides of the models of Dr. Barrett's case also considered at a later meeting as having been corrected by a *bite-plane*.

Hope that Dr. Bogue can present further particulars regarding the treatment in these cases.

Dr. Edward A. Bogue, New York City.—I have once more to make my grateful acknowledgment to Dr. Jackson for what he had done. I remember the conditions in connection with this case very well, and with your permission will try to recall them as well as I can. Dr. Colignon was one of the well-known practitioners in Paris and had been a medical man in his earlier days. He abandoned the practice of general medicine for dentistry, and has now transferred his practice to another operator. He said the only thing that remained for him to do in abandoning his practice, was to see one single patient who had been placed

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in his hands for correction, was properly cared for; and he said to me, "Will you help me?" I replied, "I will, if I can." And this is the patient.

The first thing that suggested itself to Dr. Colignon, was that he should set a rubber plate on the lower teeth which would drive the lower incisors down. He did it and accomplished it. The next thing put on, was the screw appliance above, which broadened the maxillary arch in the premolar region, but it is only honest and fair to say that that was done empirically. I do not think he knew what he was doing, because he was trusting entirely to what I told him. I did not know why it should be done, myself.

Dr. Jackson.—I have given some of the conversation had with Dr. Bogue at the Society. We were all striving to know what had taken place, and there was a great deal of discussion about it at the time, and many questions were asked. Dr. Bogue asked who could give a suggestion as to what had actually occurred. This discussion is all in print, and I am sorry I did not call attention to this before, but Dr. Bogue will remember the circumstances because that discussion was really impressive to us all. Dr. Bogue has given us his description of what has taken place.

Dr. Bogue (resuming).—I thank you very much for what you have said. This discussion which has been referred to occurred before the Odontological Society of New York. I was President of the Society at the time, and showed the other set. Dr. Barrett had taken up the work. They had all seen and knew about this case. This was the first occlusion case of Dr. Barrett. Dr. Barrett sent a letter to me with these models and described some of the details. I noted some of them in my paper.

This is a posterior occlusion of the mandibular arch. Next, we have a plate which was a lingual plate with shelf, and I had understood a lingual shelf was on the other case too. I expanded the maxillary arch. The maxillary plate struck on the mandibular arch against the crowns of the mandibular incisors. Here we spoke of changing the angle of the jaws and how it might be possible to bring about normal occlusion by really changing the angle of the occlusion. There was a discussion about getting mesio-mandibular occlusion which from that time on has been a great problem with most of us.

Dr. George F. Burke, Detroit, Mich.—Was that done without intermaxillary force?

Dr. Jackson.—Yes, without what we now term intermaxillary force, that is with no more force than would be gained by the illustrated bite-plane during occlusion.

However, the inclined plane in occlusion draws forward on the mandibular arch as I have described in speaking of methods.

One can generally correct distal occlusion more quickly by utilizing both a lingual shelf and intermaxillary force with equalizing bands.

Dr. Kingsley states in his book that he did not know just what occurred. I would like Dr. Bogue to tell us in greater detail about the case referred to.

Dr. Edward A. Bogue, New York City.—I suppose it is permissible to bring forward everything that has occurred either before or after this event in elucidation of what we are searching for.

Dr. Jackson.—That is the object.

Dr. Bogue.—Dr. Stanton told me some time ago that by getting measurements of the entire set of maxillary and mandibular teeth, he found he was able to decide in advance whether or not there was sufficient material to make what we call correct occlusion; that he was sure of that. I am repeating the idea he gave me. He has often found that expansion alone, without the intervention of intermaxillary rubber, was sufficient to get the first molars into occlusion; that he could determine from measurements all the widths of the teeth. I find he is quite correct. But neither Dr. Colignon, Dr. Barrett, nor myself knew anything about these facts when these models were made. The whole thing was done empirically, and there was a successful issue to the case.

Now, I will tell you what occurred shortly afterward, if I may. A very distinguished gentleman wrote to me first when I was in London, to come to Paris as quickly as I could, as his daughter was in trouble. He brought her along. Her mouth was as much like the slides you have seen here as you can well imagine. I consulted with my old associate (Dr. Isaac Davenport) about the case, and I consulted with Dr. Levette about the case,

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and he was one of the professors in the dental school in Paris. The result in this case was that there was an open bite. The molars only were in contact. I have these models in my possession from the beginning to the end. While I have a snapshot of the girl as she was before treatment was begun, they would never allow another photograph of her to be taken after the case was finished.

I will now go back to Dr. Ainsworth, who was Dr. Delabarre's preceptor, and the main point I remember he impressed upon me was this: You will find most of your troubles in the premolar region where the maxillary arch is always too narrow. Proceeding from that I have been following Dr. G. V. I. Brown's operation with a screw. As you all know, Dr. Brown has become an oral surgeon, but still he indulges in rapid spreading, in cases where the jaws are too narrow. He has said nothing that I could find of what he does with the mandible or with the lower arch, but he has spread the uppers precisely as these were spread, in the premolar region. He has obtained such an enlargement of the nasal passages by that process that he said to me one day when I was talking to him in Atlantic City, "I am growing up a race of giants around me." I said, "What do you mean by that?" He replied. "You are doing it yourself." Yes, I find spreading the nasal passages rapidly, results as Dr. Black, a rhinologist of Milwaukee asserts, in a dropping of the nasal septum between the two halves of the maxillæ, when they are spread apart, thus straightening out to a great degree the septum and increasing the nasal passages which afford greater entrance of air to the lungs, and the thoracic cavity is speedily enlarged. While this is a little bit off of the subject of bite-planes, it is the part which underlies what we are trying to do when we try to bring about good health.

Dr. Victor Hugo Jackson, New York City (closing).—I do not always agree with Dr. Bogue. From my experience, only a small percentage of *posterior occlusion* cases are changed to *full normal occlusion* by the lateral expansion of the dental arches. In certain cases, however, we do find in adjusting the parts that it results in Nature changing the angle of the mandible, bringing about normal occlusion. Generally, in these cases, intermaxillary force should be applied from the first.

I want to claim your indulgence for a few minutes to show the *movable model of the mandible in action* representing Figs. 17, 18, and 19, similar to cases of posterior occlusion that we have been discussing. The mandibular incisors are resting against the gum back of the maxillary incisors, and we see that intermaxillary force is required for its correction.

The maxillary molars will not permit the mandibular molars to rest on a higher plane. The incisors are antagonizing with the gum back of the maxillary incisors. Now intermaxillary force is set to work and is gradually changing the angle of the mandible. The angle is becoming more obtuse, this change of the angle bringing the mandibular incisors to a lower plane, causing them to occlude normally with the maxillary incisors, which is the principle involved in correcting posterior occlusion as described.

When the same intermaxillary force is continued too long changing the angle and causing the ramus to become too obtuse, it is an objectionable feature, this having brought about prognathism and final lack of incisal occlusion of the teeth. This prognathus condition would, if necessary, be corrected by reversing the action of the intermaxillary force, and in cases of *true prognathism,* in addition to this intermaxillary force described, force by a chin cap with cranial cap should be applied, correcting the angle of the mandible and causing it to return to more near a right angle.

In considering these laws of force for the movement of the teeth or changing the shape of a bone, it requires a steady continued force, which in effect, gradually softens or changes the cellular arrangement of the bone to permit the change, but when an intermittent force is applied, as is often applied for changing the shape of the mandible, it is ineffective. It generally causes the bone to become more dense, as the application of a force on the bone for eight hours and then leaving off the force for sixteen hours of the twenty-four would cause the bone to become more dense and better prepared to resist the force of eight hours. In other words, Nature in sixteen hours can build up and repair tissue to resist the force of eight hours, rather than causing the softening of the bone. Especially is this the case with the adult.

I want to thank you for your attention.

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PROGNOSIS IN DISTOCLUSION CASES*

By Hugh K. Hatfield, M.D., D.M.D., Boston, Mass.

ANY MAN who has treated cases enough and practiced orthodontia long enough to have observed the end results will find in his collection the inevitable apportionment of failures which may be labelled somewhat as follows—classification correct, diagnosis incorrect, prognosis disappointing, unfortunate, fatal or something to that effect.

And an attempt to explain away these failures on the assumption that there exists today any deficiency in the available technical knowledge, would scarcely be warranted or accepted as a cause.

Although fine technic and skillful operative methods may enable us to bring about nice adjustments and anatomic alterations, failures will continue to multiply so long as we continue to rely *entirely* upon the occlusal relations of the teeth to give us our interpretations of the developmental conditions present.

Therapeutic measures which ignore these underlying conditions will prove at times wholly ineffective in the presence of factors which may not only hinder, but altogether upset the most painstaking efforts.

A keen observation of Leonardo da Vinci states it in fewer words, "There is," he says, "no result in nature without a cause, understand the cause and you will have no need of the experiment."

Do we understand the "cause" and is our knowledge of the etiologic factors of malocclusion extensive enough to deny the "need of the experiment?" Evidently some men believe themselves in possession of this "knowledge," for promise of definite results is given and claims as to absolute methods are made.

The probable source of this "knowledge," no doubt, lies in the belief of a universal endowment for each individual child, a right to a harmonious design in development, as a common heritage.

To assert that changing the occlusal relations of the teeth, no matter what the etiologic characteristics, would establish a condition sufficient in itself to realize this *ideal,* is to nullify our interest in orthodontia as a profession in the field of medicine and to give it over to the craftsmanship of the artisan or mechanic.

If such were the nature of the orthodontic problem a prognosis of a successful result in *any* distoclusion case would be justifiable and safely made.

What does prognosis mean? An opinion given in advance.

It is an opinion expressed in advance of the probable course and termination of a disease and the probable modification of the course and termination as a result of treatment.

*Read before the American Society of Orthodontists, Atlantic City, April 27-30, 1921.

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Prognosis should come before treatment but the arrangement of the programme for this meeting today singularly reflects the relative position prognosis must hold in our orthodontic procedures for the present.

Postmortem perhaps might be substituted for the term prognosis for some time. It is evident that the knowledge at the present time utilized as a basis for prognostications is entirely of a statistical nature. For if the assertion be true that comparatively few of our distoclusion cases are failures, then some computation has undoubtedly been made.

Let us grant that a large per cent of distoclusion cases terminate in a successful result. Does that give us anything definite and of value as an aid in prognosis?

It may aid in prognosis to the extent of admitting a reasonable probability of success, but little more. One might say that the prognosis in distoclusion cases is probably good or favorable, but of course will vary according to the nature of the factors which cause it. Or, that in cases of undetermined origin the prognosis is good, if the proper treatment is carried out.

We would be safe in saying that prognosis is good insofar as the possibilities of development will allow. All of which is camouflage for ignorance and not likely to promote valuable contributions to our knowledge of the significance of prognosis or give much in the way of comfort to the family. This group of distoclusion failures must be critically analyzed and the knowledge gained from such an analysis must be sufficiently comprehensive to enable us to distinguish them in their early stages from those that will terminate successfully. When this is clear then will it be possible to indulge in the art of foretelling the course and termination of the specific case of distoclusion.

To express the situation briefly and bluntly—in the absence of any exact knowledge of the peculiarities of development which can be applied in the individual case, the orthodontist must in many cases blunder along with a mixture of happy hits and unfortunate misses. One of several large obstacles, I hope not insurmountable which has stood in the way of progress, is our attitude toward classification. There is a tendency to regard it as a finality. We forget that all knowledge is a classification of experiences and that our acquisition of knowledge is a progressive establishment of distinctions. The ultimate perfection of knowledge would be the recognition of all the distinctions which exist between phenomena.

Angle's classification is a general classification and we should recognize and use it as such. It distributes malocclusions into various groups which appear alike in their occlusal aspect. But if we could make a qualitative analysis of the different groups or classes, it would bring out and show each member of the different groups or classes to vary in character.

It has been repeatedly noted that two cases of distoclusion will respond to the same method of treatment so differently that if the difference in response could have been anticipated, the line of treatment could have been correspondingly modified. Because of the variability in the nature of the different cases of distoclusion we are called upon to treat, inter-maxillary

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elastics are no longer the invariable and indispensable thing in all treatment of this class. But the nature of this characteristic is not indicated in the occlusal relations, as expressed in the classification. We have advanced little beyond classifying them relative to the most prominent symptom, a physical sign which shows that an alteration of structure has taken place, but yields little information regarding the nature of the growth processes present, peculiarities of physical development or degree of mental stability or functional conditions in the individual.

In every field of medicine, including orthodontia, the individual will always be our problem; to understand the causes of his complex organization, to know how and in what way he differs from all the others in the group with similar occlusal relations. Such is the kind of knowledge we need to make a prognosis. Knowledge that will enable us to decide upon a line of treatment with a clear perception of the consequences.

Sir James MacKenzie in his recent book "The Future of Medicine" says in reference to prognosis: "The attainment of its knowledge puts the coping stone on the whole system of medicine, and all the other branches are contributory to it.

"It demands a knowledge of the cause of a disease and of its progress from start to finish, of the reactions of organs and tissues the one upon the other, and of the effects of remedial measures in modifying the progress of the disease."

Etiology then must claim first place in the consideration of prognosis, and there seems no lack of sufficient evidence of the truth of the statement, that it is only after the etiologic factors of distoclusion have been precisely determined and understood in each individual case, that we are in a position to anticipate the probable response to therapeutic measures or to truthfully predict the course and termination—the end result.

Whether or not specific causes can ever be assigned to the various disturbances of form seen in the dental arches, further advance in this field is imperative if we are ever to acquire the knowledge which will enable us to differentiate between those cases which are susceptible of successful treatment and those which are not, or still more important, to distinguish those cases which require treatment from those which do not.

Because certain clinical pictures of structural relations do not meet the requirements of what we assume the normal to be, does not at all times, without further consideration, justify treatment.

The accompanying illustrations from Keibel and Mall's Human Embryology, will show how a normal stage of growth may present an apparent malrelation of parts, whereas only when it persists or occurs at another period is it abnormal.

Fig. 1, head of a fetus 42.5 mm. seen in profile, Chapter VI. Development of Human Embryo, Fig. 71, "In the profile view the great development of the forehead region is striking and below this the root of the nose is deeply depressed.

"Finally the profile view of the head of a fetus 117 mm. in length may

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be shown (Fig. 2) and in it I would draw especial attention to the projecting upper lip and the receding chin, to the double lip and to the shape of the nose.

"In the first half of the third month the two lips project about equally (as seen in Fig. 1) but later the border of the upper lip, and the lip itself grow more rapidly so that in the fourth and fifth months it projects markedly beyond the lower lip (Fig. 2); by a stronger growth of the lower jaw and lip this difference is gradually overcome in the sixth to the ninth months but by a kind of inhibition process the early fetal arrangement may be retained in the adult to a marked degree."

Only ignorance of the developmental conditions normal for this period could mislead one to believe this to be an early stage of malocclusion. Later stages of growth in children between the ages of four and six or eight may show certain positions of the teeth, and width of the jaw or structural relations disturbing when measured by a preconceived notion of the normal and regarded by some men with unwarranted apprehension.

How slow our progress has been in correctly estimating the significance

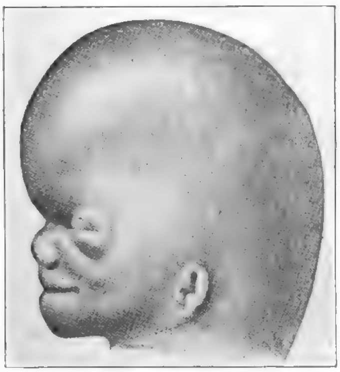

Fig. 1.

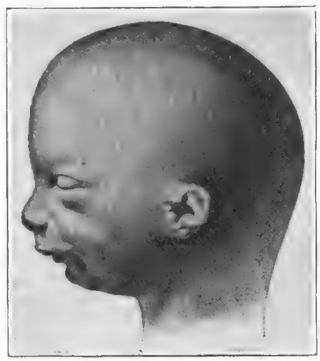

Fig. 2.

(After Retzius.) (Keibel and Mall.)

of these physical signs, may be shown on reading the observations of men surveying the same field one hundred years ago.

To quote Wedl's: Pathology of the Teeth, Growth of the Jaws. *Changes in the jaws during the second dentition:*

"Hunter was the first to assert that in the portions of the jaws in which the milk teeth are placed growth ceases after the completion of the first dentition.

"Fox agreed with him substantially. They reached this conclusion by measurements of macerated lower jaws.

"Delabarre—(Second Dentition) 1819—on the other hand endeavored by means of clinical observations to establish the fact of the growth of the bone in length after the first dentition.

"He asserts that, at the age of five to six years, the milk teeth separate from each other and says, that those people with whom this doee not occur are *liable* to have an irregular second dentition.

"Fox had recognized this occurrence before Delabarre, but did not give

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to it the same significance, for he states; the anterior portion of the jaw undergoes scarcely more than an alteration in form, it adapts itself to the permanent teeth there situated and scarcely receives any increase in size.

"Bell asserts emphatically that no reliance can be placed upon the comparison between jaws of different individuals.

"The only way to get at the truth of the matter is to examine the same jaw at different ages and then compare results."

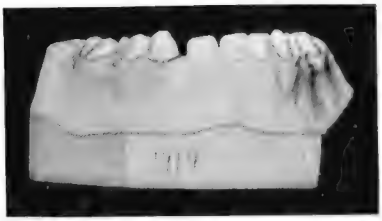

Fig. 3.

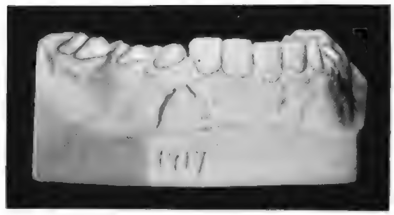

Fig. 4.

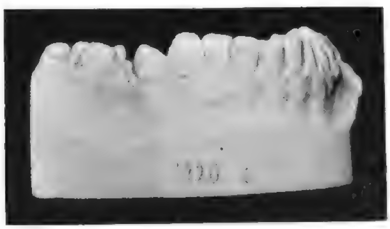

Fig. 5.

Fig. 6.—Right.

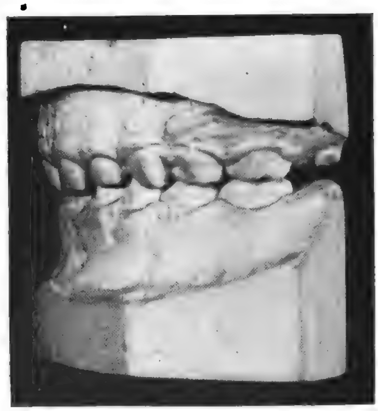

Fig. 6.—Left.

The studies of these men are in many ways in advance of current opinion today. Their observations were extensive enough to show the variability in growth processes and the varying degrees of development in individuals of the same age. Their opinions were less dogmatic which considerably enhanced their value.

A common fault today is the habit of hasty inference from a few data and as a result all emphasis has been placed on evidence to show cases developing one way, that is unfavorably. In striking contrast with this biased view

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is Kemple's contribution which proved the presence of many so-called diagnostic signs of malocclusion is *not always* to be judged sufficient evidence for a prolonged course of treatment. The true way to assess the value of these

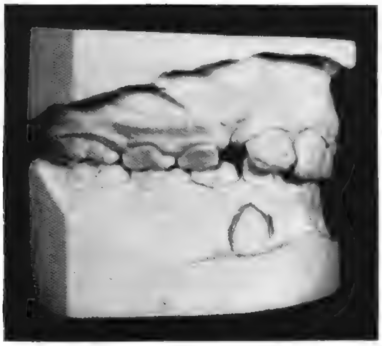

Fig. 7.—Right.

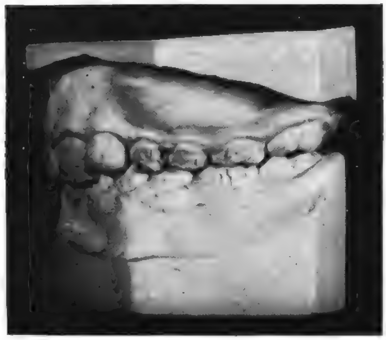

Fig. 7.—Left.

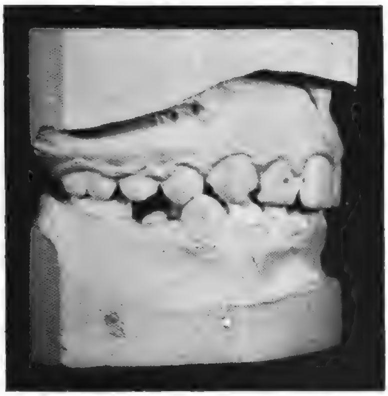

Fig. 8.—Right.

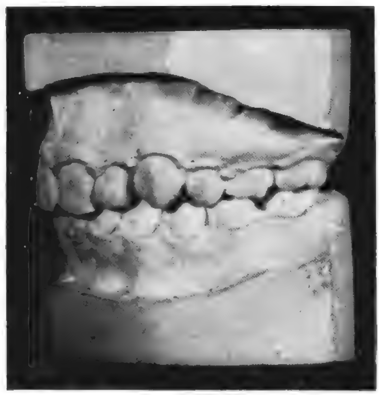

Fig. 8.—Left.

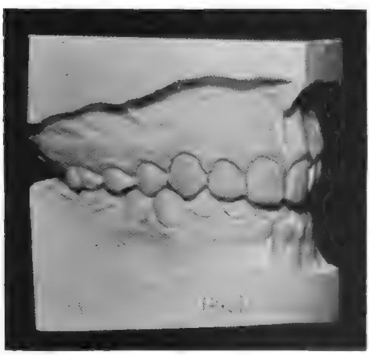

Fig. 9.—Right.

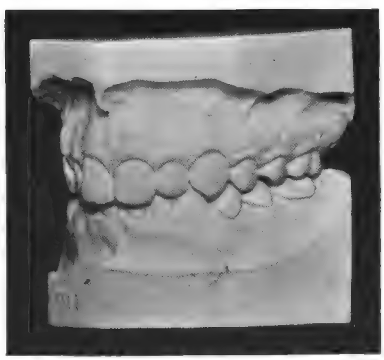

Fig. 9.—Left.

signs is to watch individuals for long periods and to find out what will happen if the condition is left untreated.

The accompanying illustrations (Figs. 3 to 9) are from my own collection of cases under observation, developing without interference or appliance of

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any kind. There were no spaces between the deciduous teeth. The child was six years old when first impression was taken. The width between the second deciduous molars was 25 mm.; mandibular deciduous second incisor lost on eruption of permanent first incisor. Mandibular deciduous canine lost on eruption of permanent second incisor. The period of observation covered is indicated by the dates on the models.

DISCUSSION

Dr Frederick C. Kemple, New York City.—I had not intended to say anything on this paper, but Dr. Hawley looked over at me, smiled significantly as much as to say, "I told you so," and I remarked to a member sitting near me that this is another splendid bit of evidence that one cannot predict just what is going to happen because the teeth during the period of transition or earlier are in malocclusion or appear to be so. I do not see that it is necessary particularly for me to attempt to discuss Dr. Hatfield's paper. He has shown very clearly by this bit of evidence that one cannot predict what is going to take place. Of course, we all know that if that child had fallen into the hands of many of our good friends, perhaps my dear friend Dr. Bogue, he would have had years of treatment and the orthodontist would have patted himself on the back and said, "See what I did."

Now, it is not wise to accept one bit of evidence like this or the bit of evidence I have shown in some models that have shown natural development, where improvement has taken place just as rapidly as it could have been safely induced by treatment, and very much better. It is not safe to accept these bits of evidence as conclusive proof that all of these cases are going to develop satisfactorily. I think it was Dr. Lourie who spoke to me a short time ago about a case that came under his observation where the deciduous denture was as nearly up to the standard ideal scheme as any I believe he said he had ever seen, and during the development that followed, a severe condition of malocclusion resulted. That is just the reverse of such a condition as is shown in this illustration of Dr. Hatfield's. It simply adds another bit of evidence to Dr. Hatfield's statement that we cannot predict what will take place through natural development, but it has been my contention that if satisfactory development does not take place, treatment later will result in almost all of these cases, certainly in the great majority of them, in just as satisfactory occlusion as you would have obtained if you had started the work very much earlier.

It is well enough to speak about giving a child an opportunity to develop physically and mentally, but these children are subnormal in school, they are subnormal physically, etc., but every one of you know that you have any number of patients in your own practice who have severe conditions of malocclusion, who are brilliant mentally and splendid physical specimens so far as you can see except this one manifestation of malocclusion. By treating these children early you are not going to eliminate the insane asylums or prisons. We are not going to get rid of criminals. I venture the assertion that if you take casts of hundreds of the professors in our best universities you would find all kinds of malocclusions in their mouths. They are not subnormal mentally. As Dr. Hellman said in the first part of his paper, we take too much for granted. We assume too much. We postulate too much. We make dogmatic assertions. As Dr. Hatfield pointed out, we are behind the men who made broader-minded observations a hundred years ago.

I am very pleased to have heard this paper and have been given the opportunity to speak on the subject.

Dr. Horace A. Howe, Boston.—I would like to ask Dr. Hatfield about the measurements of this case he treated, and whether it was a borderline case in width at the beginning or not. I think none of us would attempt to treat one of these borderline cases, and I would like to know whether the measurements were far below 28 millimeters or not, or whether it was about 20 millimeters across.

Dr. Hatfield.—This case was not treated. What do you mean by a borderline case?

Dr. Howe.—I mean 28 or 29 millimeters.

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Dr. Hatfield.—It measured 25 millimeters, and was therefore not a borderline case according to your definition.

Dr. Howe.—What is it at present?

Dr. Hatfield.—I do not know.

Dr. Delabarre.—May I ask Dr. Hatfield a few questions and crave his answers before I discuss his paper? This case, I take it, is still under observation, is it not?

Dr. Hatfield.—*Yes.*

Dr. Delabarre.—Do you present it as a case which shows normal or nearly normal development at the present time?

Dr. Hatfield.—No. I present it as a case under observation.

Dr. Frank A. Delabarre, Boston.—We all look at these cases differently. Some of us will see things in a case that others of us miss. May I give you my observations of the slides which are insufficient evidence on which to base a complete opinion. Nevertheless, I saw in that last slide and some of the preceding ones some evidences of a disturbance of occlusion which are still present. May I outline them to you?

We all know it to be a fact that in growth and development there is a forward and downward movement in the development of the mandible and maxilla. It is astonishing to me to see this evidence as you present it where the deciduous canine and the deciduous second incisor have been forced out of place by the eruption of the permanent first and second incisors with a resulting closure at a definite age of the space that should be reserved for the permanent canine and then the development going on and picturing the permanent canines and premolars coming into apparently correct position. The question arises in my mind and I admit it is a question, whether the development of the mandible and maxilla here has proceeded in a normal downward and forward direction as usual, or whether the evironmental forces which have controlled development have not resulted in a stationary position of the permanent incisor and canine teeth, or even a backward movement toward the first permanent molars. These are questions which I cannot answer, and I doubt whether Dr. Hatfield can answer them. We should not base conclusions on evidence that is incomplete. I acknowledge that in our present state of etiology the evidence is absolutely insufficient on which to base, in the first place, a complete diagnosis and a reliable prognosis, and that our treatment of today as well as in the past must of necessity be more or less empirical. It must be experimental rather than scientific and exact. To me from the evidence that has been shown, the argument that has been advanced against the early treatment of cases of malocclusion is not sufficient to deter us from giving these individuals that come to us what relief we can from the bad influences which are antagonizing the proper growth and development.

It has been said that we are not going to empty our insane asylums through any effort we make irrespective of the age at which we begin our treatment. Do you think all insanity comes from peripheral irritations? Do you think its causes arise from conditions in the mouth alone? It is absurd, gentlemen, to think so. No such claim has been made, and I want you to think the evidence Dr. Bogue has given you here today is only a modicum of what he might present to prove absolutely that the cases that have gone through his hands have shown a wonderful improvement in the physical and mental aspects of these patients. The laity do not ask for scientific proof. They do not care about the instruments you use or the methods you employ; they are looking for results, and the gratitude of one mother for the benefit that is given to her child through your efforts is adequate compensation for anything that you may attempt to do.

Dr. Lloyd S. Lourie, Chicago.—It is unfortunate that the benefit of so many good things is neutralized by indiscriminate use. The teaching of Dr. Bogue, I consider, has been of inestimable value to our specialty. Do not let us lose the benefit of it by having it reflected upon through a wrong application of it. I believe there are some cases that should be early interfered with, while there are other cases in which early interference is not justified, and certainly there are cases in which, as Dr. Delabarre has just pointed out, the prognosis is undoubtedly and entirely empirical. Let us suppose the prognosis must be em-

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pirical. Does not that argue in favor of delay instead of advising early treatment? Those are the cases in which we are not justified in interfering, where there is any doubt about it. The discussion this morning showed there is doubt in some cases as to whether interference is necessary, or whether there might be development without interference. From what Dr. Delabarre has said concerning these cases, where the prognosis must necessarily be empirical, it seems to me it is advisable that we should be more sure of the tendency of the individual case we have under observation. This report of Dr. Hatfield's is a very helpful contribution, and I make it a practice where there is doubt to take study models and keep records of them, and then I have the tendency of that case showing. In the case shown by Dr. Hatfield there is a tendency to improvement. It is not my understanding that he presented it as a finished case. It is under observation, showing that in some cases there is a tendency to improvement. Dr. Bogue has cited cases in which during six years there has been no tendency to improvement. That is not proof that after six years there may not be a tendency to improvement. I am not making these remarks because I am on the fence, or to agree partly with one and partly with the other side of the question.

Let me cite a case in which I would feel we would not be justified in interfering mechanically even though the deciduous arch showed no development of the spaces between the teeth at all, even at five and a half or six years of age. I have seen many of them in which, to my mind and my way of analyzing the case, there was satisfactory development going on in the arch supporting the permanent teeth. You find the premolars and canines developed well buccally to the deciduous teeth. If you put appliances on these deciduous teeth, any one will have to admit that they may do good in some respects, although they must be objectionable in others. They must interfere somewhat with function, and many times a great deal. I think it would be well in those cases to adopt the procedure which has been followed by Dr. Hatfield in the case just shown. I make record casts and keep the case under observation. I believe function is just as important as any mechanical stimulation, and certainly these teeth will perform better service if they are not disturbed than if appliances are put on, more or less loosening up and interfering with them. If the premolars are directly above the deciduous molars and are located in the roots of them, and you are able to carry these teeth out buccally by the expansion of the deciduous arch, is it not equally true that if these permanent teeth lie buccally to the deciduous arch you will carry them buccally beyond where they should be?

Dr. Bogue.—I would like to ask Dr. Lourie; for whose opinion I have the utmost respect and admiration, a question: Did he ever see a premolar lying buccally to the deciduous molar? I ask for information, but not in a critical or fault-finding spirit.

Dr. Lourie.—The idea I meant to convey was that the alveolar process or structures carrying the permanent teeth lie buccally to the alveolar process carrying the deciduous teeth, which would indicate to me a greater development in the arch carrying the permanent teeth than there has been in the structures bearing the deciduous. I do not know that I can say definitely that I have seen premolars lying buccally to the deciduous teeth. It has occurred to me that I might make a definite record of that condition by taking radiographs of it from above the teeth.

Dr. Bogue.—I wish you would.

Dr. Lourie.—I will gladly do that. The point I wished to make was in this case I would be doubtful as to the necessity of early interference, and I would feel safer in giving my advice about such a case to have record models of it at varying periods and be able to determine the tendency of that case. If the deciduous arch is not enlarged before shedding, there still might be plenty of development of the permanent denture.

While I am on my feet, I will say that Dr. Kemple mentioned a case about which I had spoken to him. That case was so typical of the conditions that Dr. Bogue wishes to have created as normal, or as satisfactory I had better say. The development spaces were all there and were beautiful specimens of what I considered to be normal occlusion at that age.

Dr. Bogue.—What was the age?

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Dr. Lourie.—Five and a half to six.

Dr. Bogue.—Were the teeth standing regularly in the arch?

Dr. Lourie.—Regularly. I asked the mother to allow me to make record casts of it, but for some reason or other she did not come to the office. There were four boys with malocclusion in the family, and it was thought the girl would escape but she did not.

Dr. Bogue.—Irregularity?

Dr. Lourie.—Yes.

Dr. Edward A. Bogue, New York City.—In these discussions we ought not to be dogmatic. We are learning when we come here, and show our errors. I did not bring to you the special things that Dr. Dewey was kind enough to speak about. I told him what I had done and what I was doing, and he said, "Will you read a paper on the subject before the American Society of Orthodontists?" I told him I would talk it, that I would not have a formal paper. I told him I had all the models from the beginning to the end.

I showed the photograph of the little boy, five and a half years of age, on whom I put appliances. His photographs were much better and handsomer than those I had here today. They show greater physical improvement of the boy. A sister came the same day as the boy, to see me and had her impressions taken, and I told the mother I would not touch her, but I have been getting impressions and models of her right along. She is not developed nearly as well as the boy. I put no apparatus on her and did not want to.

Dr. Lourie, I think said, that I had shown teeth up to six years of age with no improvement in their position; I don't quite remember the words he used. On more than one occasion when I have taken impressions of deciduous teeth and permanent ones as well, I have found that in from six to ten years there has been no increase in lateral growth. That is all I have ever undertaken to say. I experimented a bit and then I came to the conclusion eventually that those cases were instances of arrest in development, and now I am setting myself at work to see whether I can again start development, and if so, how, and I tried to mention it. I can think of various cases from three to six years of age without lateral growth, but after making that lateral spread of the teeth mechanically the child has grown enormously. I have I think four such cases on hand at this moment, who are taking glandular extracts as well as exercises. They are all growing, and before that, they gave the promise of being almost dwarfs.

Dr. Kemple.—I would like to ask Dr. Bogue if he has not observed many other cases where there has been ample lateral development.

Dr. Bogue.—Yes, those are the cases I do not touch, because the maxillary dental arches measure 28 millimeters or more in width.

Dr. Kemple.—But you have watched the growth and observed lateral development from year to year.

Dr. Bogue.—Yes, and from that I have deduced that with 28 millimeters or more in width, lateral growth may be possible. We ought to have 35 millimeters across the palate between the second deciduous molars, or the second maxillary premolars.

Dr. Kemple.—Dr. Hatfield has one here showing 25 millimeters.

Dr. Bogue.—That child needs development. That child with 25 millimeters across the mouth has not the vital energy to become a normal person. How are you going to give it vital energy? How are you going to prevent the child from stooping over and having curvature of the spine? How will you put into that child's head the brain that ought to be there? That is what I mean, and it is simply we do not understand each other clearly when we try to express our thoughts by means of that language which is given us to conceal thought.

Dr. Kemple.—I would like to ask whether the child whose model you have shown was developed physically or mentally.

Dr. Hatfield.—Mental development is a hard thing to determine.

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Dr. Kemple.—Did the child measure up to the average?

Dr. Hatfield.—Yes, I think so.

Dr. Bogue.—May I venture to say to Dr. Hatfield, he mentioned Fox, Hunter and others. I have them all. He did not mention Murphy, who said in 1811, that it is perfectly well known that proper care of the deciduous teeth will develop the permanent ones as they ought to be.

Dr. Hugh K. Hatfield, Boston.—I have nothing further to add to what I have already said. Dr. Delabarre's remarks it seems to me emphasize the very point I wish to make that a more careful assay of symptoms and prognostic signs must accompany all treatment. We have placed too much emphasis on signs *said* to point invariably to malocclusion as the evidence I have presented clearly indicates.

In this particular case shown it seemed to me there was a chance for a good development. I have appliances on two other children in the same family, treatment being carried on while this child was under observation. There is such a variability in the manner of development in different children and perhaps I was wrong in putting appliances on the other children.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

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DENTAL INFECTION IN SYSTEMIC DISEASES*

Facts That Our Patients Should Know, With Special Reference to Radiographic Diagnosis

By Sinclair Tousey, M. D., New York City

IT IS no new thing. Benjamin Rush over a hundred years ago cured cases of rheumatism by ordering the extraction of infected teeth. It is a new discovery that dental infection may exist for years without local symptoms, pain or swelling; and that the majority of the patients at Richfield Springs and similar sanitaria are there because of dental infection. Many of these patients obtain temporary benefit from hydrotheraphy and electrotherapy; and most of them could have been permanently cured by the timely discovery and cure of the tooth infection. Even now a cure or permanent benefit may probably be obtained by dental treatment. Probably in many cases the dental infection could have been found by the dentist before the days of the x-ray, but now this examination shows it in many cases as clearly as it shows a fracture of the bones of the leg.

A case from the author's own practice was a lady referred by Dr. Albert H. Ely more than a dozen years ago. She had sciatica and also myositis with painful nodules in the muscles of the back, neck and calves. The only relief was obtained from high frequency currents applied from glass vacuum electrodes, vibration, and the static bath and head breeze. The amount of suffering was evidenced by the tears in her eyes and by the time and money she spent on the treatments year after year.

When we discovered dental infection as the usual cause of such cases I supposed she would be one of the first to be benefited. But no, "You want

*Read at the Thirtieth Annual Meeting of the American Electrotherapeutic Association, at Atlantic City, Sept. 17, 1920.

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me to have all my teeth pulled out,'' and it was years before she would have them examined with the x-ray. Then I found several infected teeth, some of which were treated and some extracted by the dentist. This was followed by a year of freedom from suffering. Again this last winter she came with tears in her eyes, but the trouble ''could not be due to her teeth.'' ''It was brought about by great family distresses.'' And not until after a winter's electrical treatment was another x-ray examination allowed and an infected tooth discovered.

An oculist in a New England city recently asked the author whether physicians were hard to convince of the necessity for x-ray examination of the teeth and said that he had found it so. Knowing and proving in case after case that iritis and other eye troubles are commonly due to dental infection, the oculist still had a struggle with many physicians who had not seen a demonstration in their own practice. The great medical leaders in every part of the country can perform a wonderful service by spreading the knowledge which will save so much suffering and so many lives. The time has not come

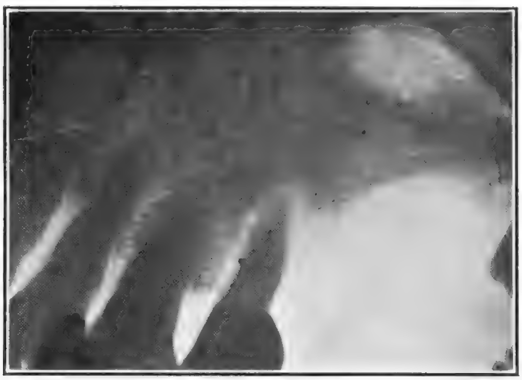

Fig. 1.—Dental infection in a case of long standing myositis.

in civil practice when the system of our army in the war may be enforced. There no diagnosis of ''rheumatism'' was accepted. It was sent back with an order to report it as myositis, arthritis, or neuritis, etc., and with orders to make such examinations as were necessary to find the infection which the arthritis, etc., was caused by and if posible to cure the infection.

I believe the time is not far distant when a patient will feel aggrieved if a physician lets him hobble around for years with a painful knee without explaining the desirability of an x-ray examination of the teeth.

We need not expect every physician or dentist to become convinced. But if the policeman's club and fines and the prison cell had not been used to enforce the sanitary regulations in Cuba and the Panama Canal Zone and we had waited until everyone there had been convinced that mosquitoes inoculated persons with yellow fever and malaria, those diseases would never have been stamped out.

I understand that the federal health authorities suspect the prevalence of dental infection to be the causative element in the spread of influenza in the

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recent terrible epidemics. It seems entirely reasonable that these germs or any others which enter by the mouth or nostrils should find a favorable site for lodgment in these infected dental cavities. If one had a pool of putrid animal matter where it could receive fecal and other discharges from every passing traveler and where it could contaminate his own water supply, infection would be a perfectly natural consequence.

A dead and putrified nerve or tooth-pulp is full of germs from which poison is absorbed into the system, it may be for years, since the pulp-chamber in the tooth cannot collapse like the walls of any ordinary boil or abscess and the lesion undergo spontaneous cure. The amount of absorption from an abscess at the apex of the root of a tooth is not indicated by the small size of the abscess cavity but by the rapidity with which the poison is generated and the freedom with which it is communicated to the blood. The free bleeding which ordinarily ensues when a tooth is extracted illustrates the anatomical fact that the tooth is not like an inanimate glass plug in the tooth socket but is a vital organ with blood vessels which must be torn wide open in order to extract it. Through this

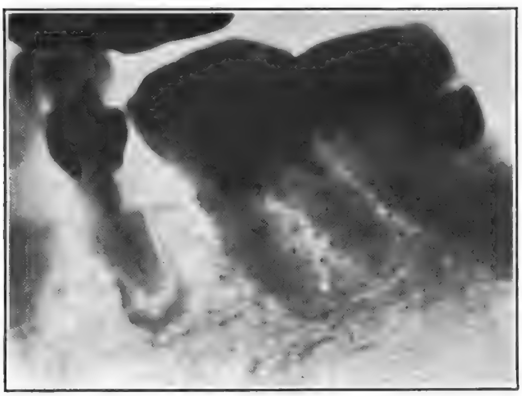

Fig. 2.—Dental infection in a case of optic neuritis with dimness of vision, "a film before her eyes," cured by extraction of the infected teeth.

free blood supply the poison from a blind abscess is poured into the system at a speed of which we can obtain some idea from the other cases of dental infection, pyorrhea. In the latter case we may be able to press a large drop of pus from the pocket surrounding the root of a tooth every five minutes.

Two kinds of poison are absorbed; the germs themselves and toxins or their poisonous products. The germs enter the blood, but there they are ordinarily destroyed by certain white blood-cells called phagocytes; and even in many cases of serious or fatal disease unmistakably due to dental infection, the germs do not grow and multiply in the blood and may not be discoverable in it. This is true in regard to certain other germ diseases. For instance, in a case of tuberculosis we don't look in the blood but in the sputum for the tubercle bacilli. When the normal resistance of the blood to invasion by the germs from a focus of infection has been lost or greatly reduced, then the germs may multiply in the blood and usually with a fatal result. A pint of blood drawn from the body, cooled and therefore devitalized, may be experimentally infected with the

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pus from an extracted abscessed tooth and if kept at a temperature of about 100 degrees F., will in a few days become a mass of living and multiplying germs sufficient, if divided up in hypodermic doses, to kill a company of 100 soldiers.

In many cases where the germs never succeed in growing and multiplying in the blood, some of them are carried by the blood and lymph to places where they form a secondary focus of infection. Such a locality is the heart valves, where a clot or vegetation may form, full of the living and multiplying germs. This occurrence is commonly the beginning of a lingering and painful death. Fragments of the infected vegetations break away and are carried by the blood, and blocking up small arteries cause paralysis, pneumonia, and a host of other complications affecting every organ and function of the body. This painful and hopeless illness in bed often lasts several months and all the time there is a possibility of sudden death from blocking of a large artery in the brain.

Happily a dental abscess almost always produces symptoms due to absorp-

Fig. 3.—Pyorrheal pockets from which a drop of bloody pus could be pressed every 5 minutes.

tion of poisons before any direct germ extension takes place. These symptoms are as manifold as the different organs to which the blood carries the poison. Seldom are two persons affected in exactly the same way. Some of the subjects have high blood pressure with a tendency to result in hardening of the arteries and finally apoplexy and death. Others have one or other of the different lesions and symptoms called rheumatism. Others have neuritis, neuralgia, various eye troubles which formerly seemed to be due to rheumatism. One eye has even been saved by the treatment of a tooth abscess discovered too late to save the other. Indigestion is a common effect. And there is a general agreement with the Mayos that ulcer and cancer of the stomach and cancer of the gall bladder are usually due to dental infection. Skin diseases and insanity are in many cases due to dental infection. A complete list of conditions which may be caused by dental infection would be a very long one.

We often hear the remark that this is a temporary fad like removing the tonsils for rheumatism.

And again the physician who recognizes the possibility and even the strong

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probability that the patient's symptoms indicate the presence of dental infection too often is told, "You want me to have all my teeth out."

It is true that many cases of rheumatism and other diseases are due to infected tonsils and that many persons have been cured by removing the infected tonsils. That was not a temporary fad but is today often the means of restoring health and saving lives.

We know that the teeth also are a source of infection, and we know that a focus of infection may sometimes be found in the pneumatic sinuses and that sometimes autointoxication may develop from primary intestinal conditions.

These facts do not make it a fad to examine the tonsils or the teeth or the sinuses or the intestines and to cure any focus of infection that is discovered. Particularly in regard to the teeth, the x-ray enables one to acquit the healthy teeth and it certainly would be a fad to go ahead and blindly extract all the teeth good and bad in a case of rheumatism.

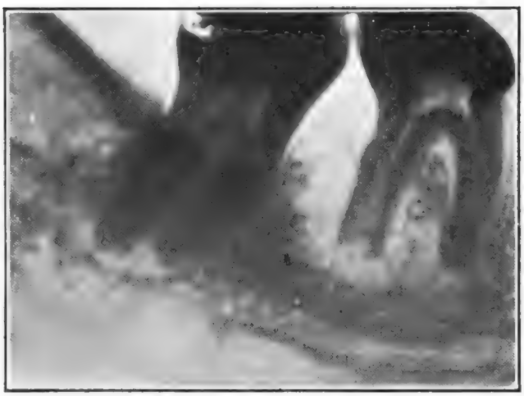

Fig. 4.—Dental infection in a case of exophthalmic goiter, cured by x-ray after extraction of infected teeth.

That the different diseases and symptoms referred to, are often caused by a focus of infection and that many of them if taken in time are cured by the eradication of the focus of infection is not the theory of one person or of any group of persons. It has been tested and proved by many physicians, surgeons and dentists in many different countries. The tests as to causation have been similar to those establishing the fact that typhoid fever is caused by typhoid bacilli and cholera by the cholera bacillus.

A great variety of symptoms are known to have dental infection as their frequent, common or even usual cause.

These symptoms may not be serious in themselves and, if they are due to dental infection, that cause may be left undiscovered and untreated for years.

Delay in the discovery of the dental infection may be because the idea had not occurred to the physician, or the patient may delay the x-ray examination because of the fear of having to have one or more teeth extracted.

This delay cannot possibly enable the infected tooth or teeth to become normal. It simply results in their getting worse, and whereas at an early

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stage the dentist is often able to treat and cure and preserve an infected tooth, an advanced stage may be reached where only extraction is possible.

The sooner an infected tooth is discovered and cured the greater is the hope that others may not become infected.

The idea used to be that an old snag of a root ought to be preserved at all hazards to prevent absorption of the alveolar process and falling in of the cheek. This is a dangerous theory and in actual practice many a patient has been poisoned by pus from an infected retained root. And the x-ray has often demonstrated extension of pyorrhea from such a root as the cause of destruction of the alveolar process of a neighboring tooth. A perfectly good tooth may be sacrificed by clinging to a dangerous and useless root.

The lower bicuspid apices are close to the mental foramen, an opening in the lower jaw through which a nerve passes to the chin and lower lip. A photograph or a radiograph of the lower jaw of a skeleton shows this opening in an unmistakable way, but the foramen has no such characteristic appearance

Fig. 5.—Root which should have been extracted and which has caused pyorrhea of a neighboring tooth.

in a radiograph of a living person. Indeed it often looks very much like a periapical abscess of the second lower bicuspid and has doubtless been frequently mistaken for one. It is only necessary to be on one's guard against this error and in case of doubt to make a radiogram of the second lower bicuspid on the other side of the face. An identical appearance of the right and lower left second bicuspids would be the strongest indication that the appearance was a normal one due to the mental foramen.

It has long been known to the author that a vital tooth may show periapical infection, and he has made a radiographic diagnosis of periapical infection in teeth which were vital, some with and some without pain. A lower molar pulp may die in one root-canal and be alive in the other and in the pulp chamber. As a rule if the radiographic appearance is doubtful it is recommended that the vitality of the tooth be tested by heat or cold or by faradism. And if found to be vital the tooth is given the benefit of the doubt. Where, however, the x-ray appearance is unmistakable, even though the tooth may respond to the heat and cold and faradism and be exquisitely sensitive when drilled into, then the

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interests of the patient require that the nerve be killed or the tooth extracted. The latter would be called for if the radiogram showed such a bending of the root that disinfection of the root-canal and of the periapical abscess cavity would be impossible. With pain and swelling, in fact with the ordinary symptoms of a dying nerve, the dentist has never been at a loss as to the proper treatment. But without the x-ray it is not always possible to determine promptly which tooth is affected, and the author has walked the floor 12 nights while a tooth four spaces from the affected one has been treated. It was a case of the shoemaker's children going barefoot and the moment a radiogram was made the error was discovered. Even in the right tooth the x-ray will sometimes be

Fig. 6.—Photograph of skeleton jaw showing mental foramen.

required to trace the root-canal and the way direction, it enters the abscess and pus wells up into the pulp chamber. Figure 8.

It is the cases of vital pulp without pain or swelling but with unmistakable x-ray evidence of periapical abscess, that are the most difficult for the dentist to decide about and he may very probably ask to have another corroborative radiogram made before reaching a decision. A very important discovery has just been announced by Hartzell and Henrici to the effect that pathogenic germs are often found in the vital pulps of the teeth affected by pyorrhea or having carious cavities. Their experiments were conducted in such a way as to apparently prevent artificial infection of the pulp and in 26 healthy teeth ex-

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tracted and opened in the same way the pulps were all found aseptic. This agrees with my own observation of many vital teeth with periapical infection.

From some cause the radiogram of a dead tooth which has been treated and filled may show the root-canal only partly filled. This appearance may be due to the use of a transparent filling material or to the filling being actually incomplete. In the latter case a space remains permanently which is exceedingly prone to infection. And where there are symptoms of infection it is often necessary for the dentist to treat the root-canal and fill it completely.

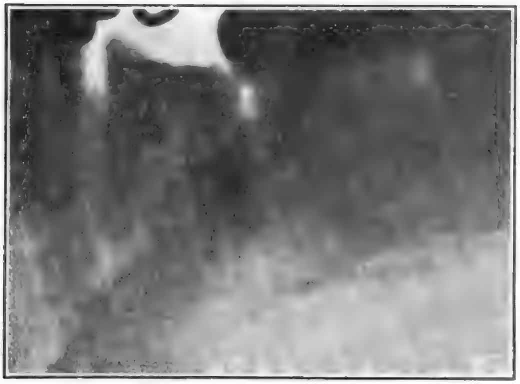

Fig. 7.—Radiogram as a guide to the dentist in opening an apical abscess through the root-canal.

Fig. 8.—Dental infection as the cause of high blood pressure, neuritis, apoplexy and death.

Many authorities favor the extraction of every dead tooth, but there are many others who believe that a dead tooth can often be sterilized and be kept in that condition for many years and for all that time be a harmless and useful member. A dead tooth is of course always under suspicion and to be kept under occasional x-ray observation. At first indication of its being infected, treatment through the root-canal should be instituted and if it becomes infected time after time for a period of years, the rule seems to be; what can't be cured must be extracted. Of course many a time the radiogram reveals such an extent of

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necrotic bone, or the symptoms of systemic poisoning are so severe that one's effort should not be to save the tooth but to save the patient.

The condition in which the tooth is found after extraction is an important subject for consideration. The tooth itself may in some cases appear normal, or close scrutiny may show a small area at the foramen where the natural smooth surface is lacking. We know that an infected root-canal and an infected periapical space causing systemic infection do not necessarily involve any marked change in the gross appearance of the extracted tooth. The dentist and the patient should not for a moment suppose that the tooth was harmless or even a desirable possession because it looks practically normal after removal. We can tell from the radiogram before extraction whether the root has been denuded or eroded and if so to what extent. And changes in the tooth itself are not the decisive factor in deciding that a focus of infection exists which, if not capable of cure by treatment through the root-canal, requires extraction.

The fang of a rattlesnake or the needle of a hypodermic syringe may be perfectly smooth and still convey an active poison. The putrescent pulp of a tooth may poison the system through the apical foramen without any necessary change in the gross appearance of the root.

We sometimes hear that some dentist has told some person that a blind dental abscess will sometimes exist for years without causing illness. The inference is intended to be drawn that, if you have symptoms or lesions which all the dental, medical and surgical authorities state are often caused by dental infection, it is just as well not to have an x-ray examination, and when one is made and shows the existence of a blind abscess the inference these people suggest is, that it may just as well be left untreated and uncured.

I don't believe that at the present time any dentist would make the statement unqualifiedly or would draw these conclusions from it. But years ago this was the case and the following history shows the natural result of such relief.

Dr. S. was referred to the author for the treatment of neuritis of the shoulder and forearm by high frequency currents applied from vacuum electrodes. At the same time he was under treatment elsewhere for very high blood pressure by x-ray flashes, a method in which the author fails to see any special virtue as compared with continuous application. He also complained of severe headache. Systemic infection from dental foci without local symptoms had not then been discovered. The author had made thousands of dental radiograms of cases with local indications and it occurred to him to make radiograms of all the teeth to see if the headache was a reflex from an infected tooth. These showed extensive destruction of bone about the apices of several upper teeth, and that report and the radiograms were taken by the patient to two different dentists who examined the teeth by their usual methods and pronounced them all right. The doctor did not want to hurt my feelings by telling me their report, and the teeth remained untreated until two years later, when he was in a serious condition at Battle Creek. Then the affected teeth were extracted and there was some improvement, but the proper treatment had been applied too late to prevent death by apoplexy at the age of fifty-six.

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Another fatal case occurred just at the transition period in our knowledge of dental infection. The patient, Mrs. T., complained of a lame lower first bicuspid tooth, and a radiogram showed an area of rarefaction diagnosed by the author as periapical infection. The dentist, however, thought the tooth was not infected but simply irritated by impact with the corresponding upper tooth. His treatment was not by opening the tooth and applications through the root canal, but by grinding the two opposing teeth. A year later a frank abscess developed with great pain and some swelling and recurrences during a long course of treatment. Later rheumatic symptoms ensued and septic endocarditis with infarctions in the spleen, kidneys, lungs, pluræ, and brain. This illness lasted seven months with pain, convulsions, paralysis and complications affecting the eye, ear and nearly every other organ. All the twenty-five general and special physicians and dentists who saw her as occasion arose attributed the illness and death to dental infection.

The natural way now is for an x-ray examination to be made upon the occurrence of the first local or constitutional symptoms and for radical treatment to be applied to any dental infection revealed.

I do not believe that a person is often well into the abscess cavity. Guided by the radiogram the dentist presses his drill into the right for years with a blind abscess of a tooth. I have known many persons who were up and about with a variety of painful if not disabling symptoms, who all this time had a dental focus of infection and who got well after the latter had been discovered and treated. To my mind, this indicates not the harmlessness of such a focus, but that very often the system is able to resist the infection long enough for the symptoms to be recognized and proper methods of diagnosis and treatment to be applied.

When a dentist or a physician says that the dental infection idea is often overdone, I have sometimes found on inquiry that he refers to a case in which he knows all the teeth of say a thirty-six year old woman to have been extracted. He naturally thinks that many of these were probably not infected and might better have been preserved. And that is exactly the reason for an x-ray examination. The strongest reason to suspect dental infection does not afford an indication for extracting all the teeth but for locating the infected ones and acquitting the harmless and useful teeth. Another dentist may refer to the fact that the radiographer has told the patient that, if the abscesses revealed had been left undiscovered and untreated, some of the serious symptoms or lesions described above would probably have ensued. The dentist thinks his patient has been unduly alarmed. And it really would have been part of wisdom as long as the examination has been made and the trouble and its remedy discovered to omit the list of the dangers that have been averted.

A patient who is a great-grandmother but is very active bodily, and mentally, has practically all her natural teeth but has a discharging abscess of an upper bicuspid. Her dentist referred her to me for an x-ray examination of all her teeth, and many chronic infections were shown with the bone so extensively involved that several teeth could not apparently be restored to a healthy

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condition. Only the lower front teeth could be given a clean bill of health. On asking the patient herself whether this had affected her general health she said "not at all." And still she had two strokes of paralysis, has paralysis of the trigeminal nerve, has a bad knee, for which the author applied high frequency current by vacuum electrode several years ago, and has some asthmatic trouble. Such a case and the numerous cases of arthritis or of myositis enduring tortures or disability for years from untreated dental infection show how slow it is to produce death by its own poison. The more terrible cases alluded to were rapidly fatal from secondary lesions which are always to be feared. But just as the rattle-snake always gives warning, these fatal complications of dental infections are practically always preceded by signs which he who runs may read. But unlike the rattle-snake its warning is not empty noise but some real injury though the latter is fortunately temporary as a rule, if the warning is heeded.

These prolonged cases could not be said to be well for years in spite of dental infection; the truth in these cases is manifestly that they have been ill for years. And it is the author's belief that, if the dentist knew all about the patient, very few cases with dental infection would be considered well for years.

An illustrative case is that of a lady about sixty years old who came a couple of years ago for dental radiography because of constitutional symptoms. A space was seen at the apex of a dead and treated tooth occupied by pus or by a granuloma. The dentist is especially skillful and experienced in the subject of dental infection and his judgment was to let the tooth alone "as long as it did not make the patient sick." This advice was taken and for two years the patient was able to be about and to enjoy life, which was the basis for the supposition that the tooth was not causing illness. All this time however, the indigestion continued and there was a gradual increase in the high blood pressure and the sense of fullness in the brain and the pain in the knee (with negative radiographic appearance) and especially a gouty swelling and redness and pain in the nose. An extended series of inoculations with extract of every conceivable article of food and drink showed no reaction to indicate that any of these caused the symptoms. Then a radiograph showed the affected tooth to be in the same condition as two years previously. It could not be cured by treatment and the dentist extracted it. A sac was adherent to the root. The symptoms including the high blood pressure were all improved immediately, and the final result was that the blood pressure became normal and remained so, and the other symptoms all disappeared.

The burden of proof should not be thrown upon the patient to prove that he is actually sick and more especially to prove that his sickness is due to the infected tooth. Such a course gives the infected tooth too great an opportunity to do irrevocable harm.

The burden of proof that the tooth is actually infected should not be thrown upon the patient, who is manifestly ill and who has a manifest periapical cavity, which might look very much the same whether it contained pus or an infected or uninfected granuloma, or who has a dead tooth from which the nerve has not been removed in whole or part, or the root of which has been only partially filled, leaving a space prone to infection.

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Whenever it is a question between saving the tooth and saving the patient, the latter must have the benefit of any doubt.

In many cases both the patient and the tooth can be saved by the treatment of the latter. But if conditions are such that the tooth cannot be treated and it manifestly may be a focus of infection, and the patient has symptoms well known to be often due to dental infection, the patient and not the tooth should have the benefit of any doubt.

In a case of disease, say rheumatism, an x-ray examination of the teeth is made not chiefly to find out the cause of the disease and a possible or probable cure, but far more to find out whether there is tooth infection, which may well be a much more important matter than the symptom or lesion which has suggested its possible presence. Supposing there is an infected tooth in a case of arthritis, how are we going to prove that it is the cause? Supposing there are tubercle bacilli in a patient's sputum or diphtheria bacilli in a culture from a patient's throat, how are we going to prove that the germs are the cause of the

Fig. 9.—Dental infection in a case of herpes zoster, tonsillar and general infection (referred by Dr. E. C. Titus).

patient's illness? Observations and experiments by the world's greatest scientists with every hospital and laboratory facility and extending over years, were required to prove that these are the cause of these two diseases. To prove it an individual case might well be impossible, and even the attempt would certainly subject the patient to experiments and delays and dangers. The usual custom is to proceed with measures of treatment and prevention of contagion just as if Koch or Klebs Loeffler had made the actual demonstration of the causative relation in our particular patient.

There are cases where secondary lesion is of so serious or permanent a character that no radical improvement seems to be expected from the discovery and cure of the primary cause. Even here an infected tooth is not a benefit to the patient and is a very probable cause of still more painful and serious lesions and of nonsuccess of remedial measures.

Dental infection sometimes shows how severe it has been by the reaction which ensues when the tooth is extracted or the abscess opened into through the

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root-canal. This is a reason for not initiating treatment of more than one focus at once.

When the dental infection is the cause of the symptoms or lesions an immediate cure is not always to be expected. A condition of the system which has lasted for years may not instantly respond to the removal of the cause, though the ultimate result may be perfect. In fact, if there is instant benefit the patient had better be warned that this may be temporary and that lasting benefit may come gradually.

Pyorrhea: This is practically always known to the patient and dentist. In England it is considered to be the most common cause of arthritis. It requires

Fig. 10.—Pyorrhea in a case of sciatica.

no x-ray examination to detect its presence. It is only necessary to realize that it can cause the same troubles as a blind abscess and that the primary infection is controllable by treatment in most cases and immediately cured by extraction in most advanced cases.

Even without any belief in the causative relation and regarding it merely as a coincidence that dental abscesses and other dental infections are frequently found on x-ray examination in cases of arthritis and a good many other diseases, no one but a Christian Scientist would for a moment doubt the desirability of discovering and curing the dental infection.

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Coming now to Christian Scientists, the author has explained to them whether from an error or from a physical cause over which the mind has no control, teeth actually do develop carious cavities which only the dentist's tool can clean out and which only filling with a suitable physical substance can protect from further decay and infection. When germs have passed through the exposed canaliculi or pores of the tooth-substance, like water through a filter, they often cause putrefaction of the dead nerve just as germs cause putrefaction of dead animal or vegetable substances entirely outside the human body. In the latter case we know that toxins or poisonous substances are produced which will injure or kill animals absorbing them, and when we see 23 persons out of a cooking class of 27 die after eating from the same supply of canned string-beans containing, as subsequent analysis disclosed, the bacillus botulinus, we cannot avoid the conclusion that it was a grave error for them to eat the infected vegetable matter. Whatever the best treatment for the resulting poison, common prudence would prompt the scientist no less than the nonbeliever to sterilize the home-made canned string-beans by the physical agency of boiling before eating them and so avoid the poisoning. A putrescent tooth-pulp has been shown by animal experiment to contain germs and toxins which will cause in animals the various lesions and symptoms which occur in human beings with dental infection. The putrescent tooth pulp is in a cavity with hard walls, which can neither collapse, and so obliterate or produce granulation, nor cure itself by any other natural process whether under influence by the mind or not. Like dislocation of the shoulder, it is a physical condition which with our present knowledge cannot be cured without the use of physical agents. Whatever may be the treatment of a burn, common prudence would suggest to the scientist no less than to the unbeliever, the unwisdom of cleaning gloves with gasoline near an open fire. Common prudence would indicate the unwisdom of allowing to remain undiscovered and unremoved a physical cause for trouble. No matter what one's belief might be, he would not leave on the surface of the body a quantity of acid or caustic alkali accidently spattered there, but would promptly wash it off. He would remove the physical cause of trouble as soon as possible, regardless of his belief and regardless of the treatment to be adopted for the resulting burn.

I understand there is a statement of Christian Science to the effect that mind is the only thing and that physical objects and forces exist only in our minds. Suppose that to be true, it is also true that we cannot live without imagining that we eat imaginary food, potatoes for instance. And we know very well that without imaginary Paris green imaginary potato bugs would have devoured the green plants and there would have been no potatoes. We think we see the potato bugs and the holes they eat in the leaves and we think we see the cavity in a tooth, or a pyorrheal pocket around the neck of a tooth or by means of the x-ray, a blind abscess about the apex of the root of the tooth. And just as much in one case as in the other, if we want healthy potatoes or a healthy mouth, we must think that we apply imaginary physical substances and physical forces to combat the imaginary harmful ones. Personally I think we must be mistaken about what the Christian Scientists believe. I think they know

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as well as we do that potatoes and potato bugs and teeth and dental infection actually exist. But they feel that, if some part of the human body were comparable to the green plant and were being destroyed or damaged by something comparable to the potato bugs, this could be combated by a mental effort without resort to physical agents. The author knows a great deal about the influence of the mind over the body and a great deal more about the physical condition present in, say, a blind abscess of a tooth. He is firmly convinced that this is no more subject to a mental effort than are the potato bugs on the living plant.

The author is not a Christian Scientist but does believe in helping every sufferer and that this is one of the cases where the aid of physical agents is required. The fact of our present dependence in some cases upon physical agents is illustrated by the case of air, water and food without which life itself ceases.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

Orthodontia — Oral Surgery — Surgical Orthodontia — Dental Radiography

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Cancer of the Tongue a Preventable Disease. J. G. Bloodgood (Baltimore). The Dental Digest, September, 1921, xxvii, 9.

The distinguished surgeon states that as a result of a study of 260 cases of cancer of the tongue, the evidence is convincing that the great causal factors are smoking, including actual burns due to this habit, and persistent irritation, especially by dirty, rough teeth and imperfectly fitting plates. In carefully taken case histories the presence of a precancerous lesion is as good as universal. In other words a campaign of education should in theory do away largely with this affection. Even in the earliest stages, about a third of surgically treated cases are doomed, and in advanced cancer this percentage is cut down to 12. By cure the author means a five year intact survival. He believes that he has saved 105 men from this disease as a result of educational prophylaxis; and the sphere of influence of the dental profession in this domain must be great. No man should continue the use of tobacco after the appearance of leukoplakia and no man should neglect to have his teeth put in order at the same period. Syphilis in the author's experience is a greatly overrated causal factor and in any case a syphilitic has sufficient outside motive for getting cured. He knows of but one way to handle leukoplakia—by radical excision without a preliminary biopsy which may stimulate the growth of the possibly cancerous tissue already present. In this excision we may find out later that we have actually extirpated a cancer.

Certain Non-Technical Considerations in the Treatment of Hare-Lip and Cleft Palate. H. E. Coe (Seattle). Archives of Pediatrics, October, 1921, xxxviii, 10.

The author refers to the ideal surgeon as "a medical man who performs surgical operations." He is therefore in position to fix the optimum moment for an operation and to prepare the patient for the intervention. The double criterion in operating for these malformations is the optimum moment in development and the optimum of general condition. When the time is ripe the pediatrist calls upon the surgeon, who, in the absence of the former, would be very apt to operate when first summoned on the theory that operation being

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inevitable had best be done as soon as possible. In regard to general condition the child should be putting on weight at a normal rate, and should have a good blood count and be free from local infection. But while hare-lip may be operated on as soon as the fifth or sixth month cleft palate must be left to the twelfth or eighteenth. The author lays down no rule when the two malformations co-exist in the same patient, but we find the statement that when the lip is operated on, cleft palate if present should also be treated at the same time. Since it is urged that the palate should not be closed until the period above mentioned and that in some children there should be considerable preparatory treatment which may comprise tonsillectomy, etc., and further, that time may be required to bring up the hemoglobin to 80 and the weight to the normal figure, it would seem to follow that the hare-lip operation be left until the palate is ready for closure.

The Prophylactic Value of Nitrous Oxide-Oxygen in the Removal of Diseased Teeth. B. H. Harms (Omaha). Current Research in Anesthesia and Analgesia, November 15, 1921, Bulletin No. 16.

The author sums up in advance that when he uses a local anesthetic for the extraction of infected teeth the patient is apt to develop a more or less violent reaction or an exacerbation of the infection. If on the other hand the nitrous oxide-oxygen association is used this sequel is practically never encountered. Thus it may happen that an autoinoculation which follows extraction under local anesthesia may doom a robust man to hospital confinement while the opposite condition may be seen when a safe extraction of numerous infected teeth from a bedridden patient may enable the latter to leave his bed. Local anesthesia involves meddling with the existing conditions. The circulation is interfered with and this lowers the powers of resistance to infection. Even in nerve blocking this occurs save when the tissues blocked are the gasserian and sphenopalatine ganglia. It is quite likely, however, that local anesthesia for the extraction of one or two incisors might entail no risk if the operation were limited to blocking the inferior dental nerve. A bloodless operative field is attractive to the operator but the patient's ultimate welfare comes first.

Oral Sepsis as a Source of Systemic Disease. J. H. Rishmiller (Minneapolis). The Journal-Lancet, Oct. 20, 1921, xli, 20.

The author is prominent as a railway surgeon and some of his cases are in railway employes. The subject of oral sepsis includes septic mouth in the local sense, and metastatic infection from the same. Naturally there may be metastases from mouths which may not present clinical sepsis. In certain cases severe injury may be the starting point of metastases. Thus in the case of a brakeman in a railway smashup the patient did not recover as he should have after his sprains and bruises had disappeared. He had numerous areas of pain and soreness in the trunk and limbs. In the course of a routine examination it was noted that of the twenty teeth which he retained ten were

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loose. An x-ray examination led to the advice that every tooth in his head along with four stumps should be extracted. He at once improved following the extraction and in three weeks was free from all symptoms. This case illustrates the relation between septic mouth on the one hand and pseudorheumatic and pseudoneuralgic affections. The joints, muscles, ligaments, bursæ, etc., may not show symptoms until there has been a diffuse traumatism. However, the latter is by no means necessary or the rule. In a second case cited the patient did not recover from an attack of so-called grippe. His symptoms suggested exophthalmic goitre or cardiac disease with evidences of mental disorder. A neurologic examination did not clear up the case save that organic disease might be excluded. As the tonsils and teeth showed evidences of suppurative foci these structures were removed, whereupon the mental apathy and drowsiness at once improved and he was accepted for military duty. In a third case rheumatism was so closely simulated that a purpuric rash developed, but extraction of infected teeth corrected the condition without resort to salicylates or other drugs.

Pyorrhea Alveolaris. H. Clay Watson (Waco). Texas Dental Journal, September, 1921, xxxix, 9.

This paper was read by request. He had taken a course under Dr. Hartzell at Dallas and holds to the latter's teachings, save in a few cases in which he removes pockets surgically. He believes it ethical to give the patient that type of treatment which we would give ourselves and hence while there may be good ground for extraction, one may personally lean to conservation for self and family. For the same reason he would prefer a less skilled and experienced dentist to a master, if the former were conservative and the latter radical. To leave a tooth behind is not like leaving a tonsil behind and seldom does harm.

Under causation of pyorrhea he accuses acid-forming bacteria which collect and multiply between the teeth, doubling every 22 to 35 minutes. The acid excreted forms the lime deposit on the teeth. Naturally these germs subsist best between badly occluded teeth or teeth which are neglected. In diagnosis the x-ray is not only indispensable at the start but shows the progress of the case under treatment—for example it may show mouths in fair condition when the teeth have hardly any bony attachments left. The general rule, of course, is to extract when ½ to ¾ of the attachment has been forfeited. In prognosis everything depends on the patient's willingness to cooperate, in the tedious daily cleansing of the teeth. A vital stain should be used to show the patient the diseased area. Not until the patient has learned the daily care of the teeth should the latter be scaled by the dentist. If the pockets are not surgically removed they must be medicated with the iodine-creosote application.

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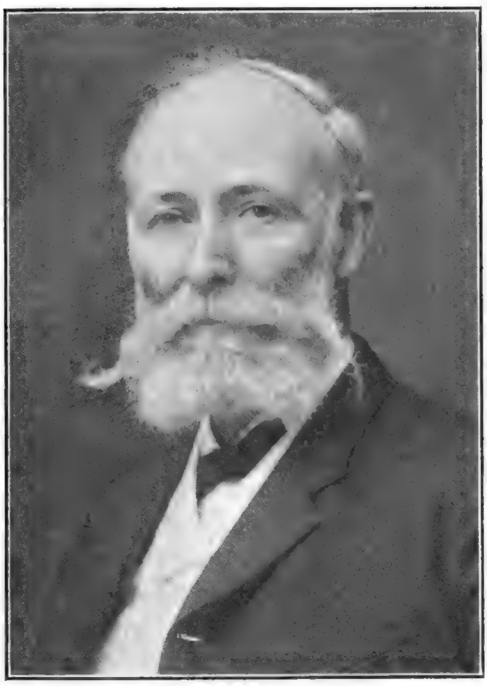
IN MEMORIAM

DR. EDWARD AUGUSTUS BOGUE

EDWARD AUGUSTUS BOGUE, born in Vernon, Oneida County, N. Y., 1838; died in New York City, 1921; the descendant from a long line of Scotch Presbyterian clergyman.

His father was Rev. Dr. Horace Publius Bogue and his mother Grace Caroline Brown.

Doctor Bogue's earliest education was obtained in his father's study and at Seneca Falls Academy under Prof. Orin Root, Sr. Ill health prevented a college course in letters and his professional training was begun at a very



Dr. Edward Augustus Bogue.

early age in the New York College of Dental Surgery at Syracuse under Prof. Amos Westcott, with whom he remained as a private pupil after having taken three courses in the college.

His first position after leaving Dr. Westcott was with Bartlett and Miles in Ithaca, N. Y., which was interrupted by another serious illness, after which he left Ithaca. Upon recovering from that illness he went to Chicago into the employ of Dr. William H. Kennicutt with whom his elder brother had been

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associated in the practice of dentistry until his death. He was shortly received into partnership with Dr. Kennicutt, with whom he remained several years, later opening an office for himself and continued in practice independently until some time after the death of Dr. Kennicutt. During these eight years of practice in Chicago he was frequently called to the assistance of Dr. Freer, professor of surgery at Rush Medical College, and Prof. H. A. Johnson, with whom he afterwards became a special student in medicine, attending his first course at Rush College, and subsequently attending a final course at Castleton, Vt., under the special instruction of Prof. C. L. Ford, the anatomist. Shortly after graduating in medicine he began the study of French and German, which led to his becoming the teacher of a French Bible Class, composed mostly of members from the congregation of the French Catholic Priest—Father Chiniquy—who had become Protestants and removed from Montreal to Kankakee and St. Anne, Ill., leaving a little remnant, by the way, in Chicago. This Bible Class later on became a French Protestant Church, attached to the Old School Presbyterian body.

On the breaking out of the Civil War, Dr. H. A. Johnson of the Examining Board of Surgeons urged upon Dr. Bogue the acceptance of an appointment as surgeon in an Illinois Regiment, but upon examining him physically the Examining Surgeon ordered him to go to Europe to seek a restoration to health, which he said would only come with freedom from work for a time. Several acres of land, now lying within the City of Chicago, were sacrificed to procure the means for his first trip abroad, which occupied about ten months. A considerable portion of this time was spent in the mountains of Switzerland to his improvement in health and strength.

During this trip the treatment of cleft palate became of interest to him, and on his return to America he landed at Boston and became acquainted with Dr. Thomas B. Hitchcock, Dean of the Harvard University Dental School, who also had been giving some attention to the treatment of cleft palate. From Boston he went to New York, meeting Dr. N. W. Kingsley, and spending with him sufficient time to become fairly acquainted with his method of treating this malady.

On his return to Chicago he contributed to the Chicago Medical Journal of which Dr. N. S. Davis was editor, an article on the mechanical treatment of cleft palate, which was published in 1863, and which led to a further correspondence with Dr. Kingsley. This resulted in Dr. Bogue's removal to New York in October, 1864, to become associated with Dr. Kingsley, and to care for his practice during Dr. Kingsley's absence in Europe. A successful practice was very rapidly built up so that New York became from that time forward, his home.

About 1870 Dr. Bogue was called to a lectureship in the Harvard University Dental School, in which capacity he served five years, until after the death of Dr. Hitchcock.

About 1875 Dr. Hitchcock and Dr. Bogue agreed upon a plan for opening an office in Europe, where it was hoped the expenses of a vacation trip for each of the partners concerned might be earned while the families of each

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might enjoy a temporary home with the advantages of European life and study during what otherwise would be the vacation time. Drs. Moffit of Boston, Cook of Brooklyn, and Daboll of Buffalo, were included in the scheme, but before its consummation Dr. Hitchcock died. The office was nevertheless opened in the autumn of 1877 under the firm name of Bogue, Moffit, Cook and Daboll at 39 Boulevard Haussmann, Paris, with Dr. Junius E. Cravens of Indianapolis as first assistant and incumbent. Two or three years later Dr. Isaac B. Davenport became associated with the firm and remained associated with Dr. Bogue after the final dissolution of the firm at the end of the partnership agreement, and for several years thereafter. This office continued in existence twenty-three years, at the end of which time Dr. Bogue relinquished his practice in Paris to Dr. George A. Roussell to confine himself exclusively to New York.

During all these years from 1863, Dr. Bogue has contributed, what he calls ephemeral articles, on dental subjects, which are scattered through various magazines, principally the *Cosmos, International, The Digest* and the *International Journal of Orthodontia and Oral Surgery.* Some of these articles have been translated and published in other countries and one or two of them have been utilized for purposes of instruction in several of the dental colleges.

His inventions in the line of his professional work are numerous, but he never took out a patent, believing that as a member of a liberal profession he owed as great liberality to others as had been shown to him by his instructors.

He was one of the charter members of the American Dental Association when it was organized at Niagara Falls. He was made Secretary of that Association shortly afterward, and at the time Dr. Taft was made president he was chairman of the Committee on By-laws, which arranged for the election of officers at the end of the Sessions rather than at the beginning, it having been found in those early days of dentistry that the main interest in meetings centered in elections, and after elections were over the numbers in attendance rapidly diminished.

Dr. Bogue was probably one of the first foreigners to be elected to full membership in the Odontological Society of Great Britain, and for the last few years has been one of the nonresident councilors. He was also made a member of the Odontological Society of France, and of the American Dental Club of Paris, of which he has been president. He has also been president of the New York Odontological Society; of the First District Dental Society of New York, and of the New York Institute of Stomatology. He was also a member of the New York State Dental Society, the American Academy of Dental Science of Boston, the International Dental Federation and was a member of the New York Institute of Dental Technique, before the society was merged with the First District Society of New York. Dr. Bogue was made a life member of the First District Dental Society shortly before his death. The last paper that he read was given before the American Society of Orthodontists, of which he was a member, in April, 1921. He was an honorary member of the Alumni Society of the Dewey School of Orthodontia, which honor has been conferred upon but one other, namely, Doctor Victor Hugo Jackson, of

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New York City. He was for nearly twenty years one of the Examining Board of the First Judicial District of the State of New York, until the district boards were abolished in favor of the State Board at Albany.

In 1865, Dr. Edward Delafield, then president of the College of Physicians and Surgeons, suggested the formation of a Dental Department in connection with the College, asking Dr. Bogue whether he would accept a professorship should such a department be established. He declined to do so, first on the ground that he was not sufficiently qualified, and secondly, that being a comparative stranger, the general support and sympathy of the dental profession might not be secured, suggesting that the naming of such a professor should be left to the First District Society, the College retaining the veto power. This led to an effort to incorporate the then existing but not very flourishing New York College of Dentistry with the College of Physicians and Surgeons, with results that were so far from satisfactory that not only was there no union, but certain friends of the proposed measure withdrew their favor.

During the last twenty years of Doctor's Bogue's professional life, he was widely known for the interest that he took in the study of malocclusion. It interested him more than any other line of professional work. A great amount of his time was given to the study of the development of dental arches in children, and his last few papers, as published in the *Dental Digest* and the *International Journal of Orthodontia and Oral Surgery* dealt exclusively with the benefits that could be derived from the early treatment of malocclusions. He even went further in his theory, contending that most malocclusions could be prevented if the deciduous arches were given the proper treatment before the eruption of the permanent teeth. He contended that the deciduous arches should have a certain width at the age of five years, and if that width did not exist we could safely conclude that the child was not developing normally. The reasons for this deduction were based on the examination of a large number of children with normal dentitions and who showed a normal development, as compared to others who were abnormal. In his late years, he claimed that if the dental arches of children were underdeveloped it meant there was lack of growth in other parts. He stated there were three ways of producing the proper development of the dental arches; mechanical interferences with orthodontic appliances which would supply the stimulation that had been lacking; the proper food and exercise, and the employment of internal medication especially the extracts of the ductless glands.

At the time of his death, he was doing considerable work to show the benefits that could be derived by the use of extracts of the ductless glands. Several patients were under treatment, which we had the privilege of observing that were showing marked improvement.

Doctor Bogue's interest in orthodontia enabled him to collect a large number of casts that were made of patients at various ages. His collection of casts extending over a period of over forty years, show the position of the teeth a long time after the malocclusion was treated. He also has casts of individuals in whom the malocclusion was never treated, taken fifteen and twenty years apart.

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We know of no collection of casts in which there is such a variety of cases shown or in which they have been gathered from the same patient extending over so long a period of time.

During Doctor Bogue's long professional life he was very careful to make records of all of his work and those records were very carefully preserved. A great many were made in his own handwriting, and it was our privilege to examine some of them a short time before his death.

Doctor Bogue has always suffered more or less from ill health. A misfortune which overtook him during the late years of his professional activities, would have discouraged many men, but he continued to work and to preach his doctrine of preventive orthodontia.

It is very fitting that the last paper which he presented was given before the American Society of Orthodontists. It was very well received by the majority of men present, showing that while some men may not accept his work as final, still his ideas are being accepted as part of modern orthodontic teaching which will probably become more valuable in the passing years.

RESOLUTIONS RELATIVE TO THE DEATH OF DR. MATTHEW HENRY CRYER

WHEREAS in the death of Dr. Matthew Henry Cryer the Academy of Stomatology in common with the whole dental profession has suffered an irreparable loss we, his colleagues of the Academy, desire to thus record our recognition of his services to dental science and our appreciation of his high character as our friend and professional associate.

Dr. Cryer was one of the founders of the Academy of Stomatology and was always actively interested in its progress and welfare. Many of his contributions, the results of his original research, were first brought to the attention of the dental world through the medium of the Academy meetings. As a participant in the discussions of papers his remarks were always those of the constructive critic, the seeker after truth and devoid of the dogmatism of the special pleader. He was thus always a stabilizing influence in directing the debate through the mazes of error and personal feeling toward the calm, clear waters of scientific truth.

As an original researcher in the domain of anatomy both human and comparative, his publications record the extent and character of his life-work in a field where his name stands preeminent among distinguished co-workers whose reputations are world wide and forever enduring.

As an oral surgeon his attainment places his name beside that of Garretson as the creator and principal exponent of that now well established and important specialty.

In his professional relationship he was the ideal colleague, the helpful and loyal friend.

We, his fellow members who throughout the life history of the Academy

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of Stomatology, have enjoyed the privilege of intimate professional and friendly relationship with him, mourn in the common loss which dental and medical science has sustained in the death of Dr. Cryer. Therefore, be it

RESOLVED that this expression of our appreciation of his worth and our sorrow at his loss be recorded upon the minutes of the Academy of Stomatology and that a copy thereof be sent to his family and to the dental journals for publication.

EDWIN T. DARBY,
DANIEL NEALL MCQUILLEN,
EDWARD C. KIRK, CHAIRMAN.

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EDITORIALS

Are Entrance Requirements to Medical and Dental Schools Becoming Too High?

WE HAVE always been in sympathy with higher education, and believe medical and dental students should have sufficient preliminary education before they begin the study of the profession.

During the last few years, we have noticed a tendency in both the medical and dental schools to raise the preliminary educational requirements so high as to be in danger of passing a practical point and making preliminary education an obstacle, and probably produce more harm in the professions than would result if entrance requirements were not raised so much.

Recently in conversation the dean of a medical department of one of the large universities expressed regret that he had to turn down so many young men, who would otherwise be a credit to the medical profession, because they were short some of the credits required in the medical schools at the present

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time. It is a well-known fact that medicine has had much higher requirements for a number of years, than dentistry, and we are able to observe some of the results which are occurring because of that fact. In the first place, the number of physicians has been reduced to the minimum and it is questionable whether enough medical men are being graduated to give the proper attention to the public, even in normal conditions. In the case of epidemics, which was shown a few years ago by the epidemic of influenza, the medical profession is greatly overtaxed to provide the proper medical service.

As a result of this, we also see certain things beginning to develop that are probably going to produce more harm than would occur, even if physicians who were not so well trained as the present standards hold, were allowed to practice medicine.

I refer to the rapid development of neuropractic, chiropractic, and osteopathic schools, as well as many cults which are springing up in the various cities. We find the students who do not possess the proper preliminary education that medical schools require, are taking up these various practices and cults, and we also regret to state that in a number of instances, state laws are being changed so as to give chiropractic, osteopathic and neuropractic and other so-called "schools" practically the same standing as the medical schools. With these schools being recognized by state boards, the public will probably suffer more from improperly trained men, coming from these schools than they did years ago when medical schools were more numerous and the standards not so high as they are at the present time.

In other words, we believe that a man who is a high school graduate and spends four years in a reputable medical school will do far less harm than these graduates of chiropractic, osteopathic and neuropractic schools that now exist all over the country. Therefore, these pseudoscientific schools have been able to exist and in fact have come into existence because of the fact that medical requirements and medical education has been placed on such a high standard, that it is becoming impractical and impossible for but a few individuals to study medicine at the present time. While we are in favor of higher education and higher medical standards, we must not forget that the point may be reached where more harm may be done the profession and public by these high standards, than if the standards were lower and more practical.

Since medical schools have raised their standards to such a high degree, we find a certain group of men in the dental profession who are clamoring that dental education have the same high educational requirements. We admit this is very idealistic, but we contend it is very impractical, and is bound to do much harm to the dental profession and the public. In fact, dental education, when it required a man to have four years of high school and take four years of training in a dental school, had reached about as high an educational point as it could and still remain practical. If any individual student wishes more education, either before he enters dental school or after completing the dental course, it is perfectly feasible for him to follow that plan of study, and then it remains to be seen whether he is better equipped to serve the public

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than the student who only has four years of high school and four years of dentistry.

We have always had in dentistry a number of men who possessed medical and dental degrees and who were college graduates before studying dentistry, and in some instances these men have rendered superior service to their profession and the public, while in other cases the service which they rendered has not been superior to that given by individuals who did not have so much education.

This year a number of schools required one year of college instruction before a student could enter dental college, and that as a requirement has been a great hardship on many students and has been more or less impractical in some schools that have adopted it. In fact the State of New York was confronted with rather an unusual proposition owing to the fact that students in New York City who desired to study dentistry had considerable difficulty in obtaining the one year of college work before entering dental school. We do not know what the final arrangements are that have been made with the Universities, but we do know that several students who applied for one year in college work in order that they might study dentistry, were informed by university authorities that no provision could be made for one year students, because the universities and colleges were filled to capacity with freshmen students who intended to complete four years of college work. In other words, none of the universities were anxious to accept students for only one year of college work because it made their freshman class very large and then would result in a small sophomore class owing to the fact that a number of students would drop out to study dentistry. Even in some of the universities that have dental departments, we have been informed by collegiate authorities, that they object to taking one year students and training them for dentistry because of the reasons mentioned.

Therefore, the one year of college instruction became rather an unwieldy thing from the practical educational standpoint, regardless of whether the extra year is time well spent. So far as professional training was concerned, we have always contended that this extra college year was practically a year wasted because it was taken up in the study of subjects which had very little practical bearing upon dentistry. Such subjects as are of value that are given in one year of college work can be included in the four year dental course by a careful arrangement of time and study during the student's career.

Not being content with four years of high school and one year of college work as preliminary to the study of dentistry, some schools are now advocating two years of college work before the beginning of the four year dental course. We fail to see how two years of college work is going to be any benefit to the student in the study of dentistry. We still fail to see how that is going to aid him in the study of pathologic conditions or in saving pulpless teeth. However, not being satisfied with two years of college work, a few schools are advocating that a student should have an A.B. degree, and others, a medical degree, before they study dentistry. These latter propositions seem to be very imprac-

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tical. We have said before that we have no objection to a student's having an A.B. degree before he studies dentistry, or to his getting a medical degree, either before or after his dental degree, but to make every student fulfill those requirements would be making an autocratic requirement that would exceed all practical results.

We recently heard the dean of one dental school state that they were planning in 1926 to make all dental students possess an A.B. degree. The question naturally arose in our minds: Why should this school stop with an A.B. degree and not require all students to have a degree of Doctor of Philosophy, before studying dentistry? One degree seems to be about as practical as the other.

It is a pleasure to note that some university authorities are beginning to see the impracticability of the high requirements held for dental students by the dental departments in universities. We notice in a published interview Chancelor Hall of the Washington University in speaking about these proposed high standards for education says: "It might prove impracticable, until the public comes to a more thorough realization of the importance of dentistry as a profession. Should this very protracted and rigid course be adopted by university dental schools, the probabilities are that the attendance at such schools would materially decrease for a period of years; in fact, it is not yet demonstrated that university schools can continue under such heavy expenditure as this plan would require with such meagre returns as are likely. In other words, the financial problem may become so serious as to make the adoption of the proposed plan impracticable, at least for most schools."

Chancelor Hall was speaking from the University viewpoint, more than from the point of the profession or the public. He considered the plan might become impractical so far as the schools were concerned, but failed to give recognition to the fact that it would become much more impractical from the standpoint of the profession and the general public. We have previously mentioned the fact that because of high medical requirements a large number of men are being kept from the study of medicine, and are taking up study in neuropractic, chiropractic and osteopathic "schools." Dentistry is fast approaching the same position so far as pseudoscientific dental "schools" are concerned. If dental educational requirements are raised any more, it will make the study of dentistry more impossible than it is at the present time. We will find a great many men taking up dentistry in a so-called "school of mechanical dentistry," several of which already exist, and which are crowded with students because the men do not have sufficient educational requirements to study dentistry, and consequently are taking up mechanical dentistry. We find these schools of mechanical dentistry sending out very misleading advertisements, trying to convey the impression to students that they are studying dentistry and learning a profession, when as a matter of fact they are studying only a part of dentistry.

We find, however, some men in the dental profession who are in favor of these "schools of mechanical dentistry" and believe that dentistry should be split up between men who have had a high professional training and those

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who have had only a mechanical training. That plan of instruction and practice has existed in some of the European countries for a number of years, and in the countries where it has existed, dentistry has never obtained the high recognition that it has in America. If we could keep the "schools of mechanical dentistry" in their proper place and be able to regulate the practice of men who had graduated from them it would not be so bad, but just as sure as the "schools of mechanical dentistry" become numerous and we have a large number of men graduated from them, we will find that these men will succeed in getting the state laws so changed as to license mechanical dentists to practice upon patients. They will have the law changed to enable them to take impressions and make artificial restorations, and it would not be long before they would do actual surgical work in the mouth.

Some men may believe the passage of such laws to be impossible, but it would not be impossible because the arguments would be held out to the public that mechanical men would render more economical and superior service if allowed to practice by themselves, instead of being allowed to work under the supervision of a dental surgeon.

It therefore seems to us that in viewing this subject of higher dental education from a practical and economical standpoint, there is great danger of the plans, as advocated by some schools, doing more harm in the end than they will do good. We believe it is the time for the dental profession to take an inventory of this educational problem, and see whether they have not been too lax in allowing a few men to have too much to say regarding a matter that is of vital importance to the entire dental profession.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The next meeting of the American Society of Orthodontists will be held in Chicago, Illinois, at the Edgewater Beach Hotel on April 24, 25 and 26, 1922. A very interesting and instructive program has been arranged by the Board of Censors, consisting of Clinics, Case Reports and Papers of unusual merit. Reservation should be made early in order to secure the best accommodations.—Ralph Waldron, Sec.-Treas.

New York Society of Orthodontists

The next regular meeting of the New York Society of Orthodontists will be held during the afternoon and evening of Wednesday, February 8th, 1922, at the Hotel Vanderbilt, Park Avenue and 34th Street, New York City.

A scientific program including clinics and case reports will begin promptly at four o'clock. Dinner will be served at about six-thirty o'clock and the scientific program continued at the conclusion of the dinner.

Members of the profession interested in the science of orthodontia are cordially invited to be present. William C. Fisher, Secy.-Treas., 501 Fifth Ave., New York City. J. Lowe Young, Pres., 18 West 74th Street, New York City.

Alumni Society of the Dewey School of Orthodontia

The next annual meeting of this society will be held on April 27-28th at the Edgewater Beach Hotel, Chicago. The usual high standard of the meetings of this society will be maintained. All interested in orthodontia are cordially invited to attend these meetings. George F. Burke, Secretary, 741-43 David Whitney Bldg., Detroit, Michigan.

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ORIGINAL ARTICLES

STIMULATING ARCH DEVELOPMENT BY THE EXERCISE OF THE MASSETER-TEMPORAL GROUP OF MUSCLES*

BY ALFRED PAUL ROGERS, D.D.S., A.M., BOSTON, MASS.

Assistant Professor of Orthodontic Research, Harvard University Dental School

I SHOULD like to show you a few cases that have been treated by stimulating the muscles of mastication; and possibly by so doing encourage you to take a little further interest in this phase of orthodontia. With me this method of practice is increasing steadily, and with results that justify its continued study and application.

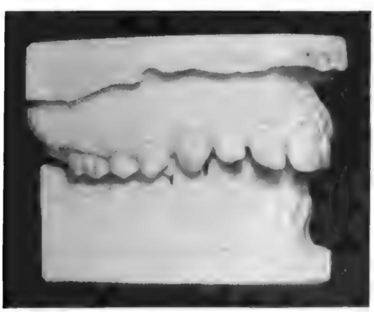

Fig. 1.

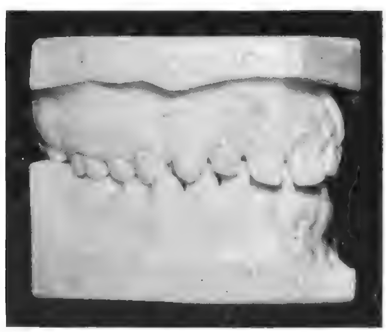

Fig. 2.

Fig. 1 is a case in which the *preliminary treatment* has been accomplished without apparatus. It will be seen by the study of this picture that the case is one of distoclusion which under the ordinary method of treatment would call for appliances on both arches with intermaxillary elastics. The muscular development of this child's face was particularly deficient. The masseter-temporal muscles were so poorly developed that the child had little conscious con-

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 26-30, 1921.

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trol over their action. She was taught first to place her arches in a position of mechanical advantage and while in this position she was encouraged to make conscious and persistent effort to contract and relax this group. These muscles gradually grew in strength, and it was not many months before I found that the child was able to masticate with her arches in the correct mesio-distal relation. Of course, the condition of the anterior teeth will have to be corrected by apparatus, but the retention can be greatly facilitated by strengthening the orbicularis oris muscle. Fig. 2 will show you this same case after six to eight months of exercise. Figs. 3 and 4 give you a very adequate

Fig. 3.

Fig. 4.

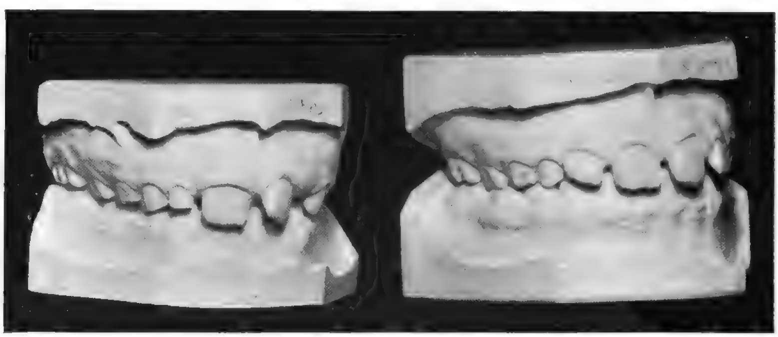

Fig. 5.

idea of the muscular improvement. You will see at once that the face is much better developed, a digital examination would show you a very satisfactory muscular tonicity as compared with the original.

There must be many cases in the practice of each of us that can be improved to a certain point without appliances. I am going to illustrate two more in which the only appliance used was the lower lingual wire with a supplementary treatment consisting of increased muscular activity.

Fig. 5 shows you a child seven years of age. The treatment consisted of

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TABLE I

MAXILLARY	BEFORE TREATMENT	AFTER TREATMENT	GROWTH
First permanent molar	33 mm.	35 mm.	2 mm.
Second deciduous molar	30 mm.	34 mm.	4 mm.
First deciduous molar	27 mm.	33 mm.	6 mm.
Deciduous canine	26 mm.	29 mm.	3 mm.
Molar to central	36 mm.	39½ mm.	3½ mm.

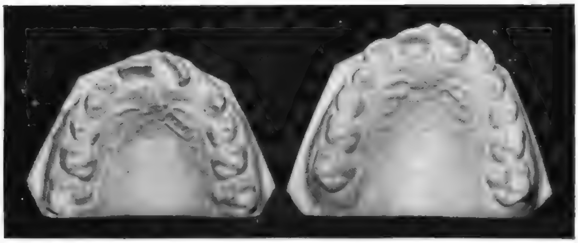

Fig. 6.

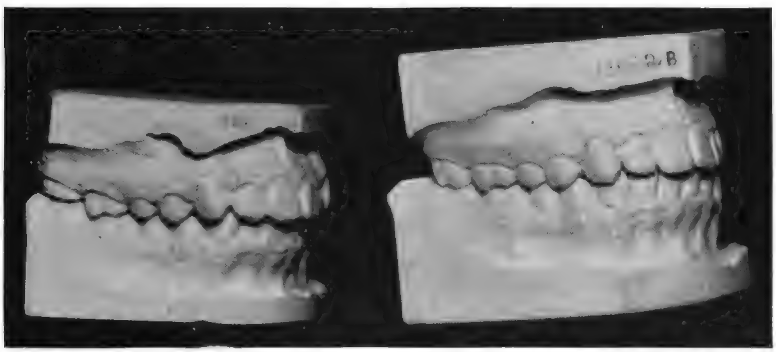

Fig. 7.

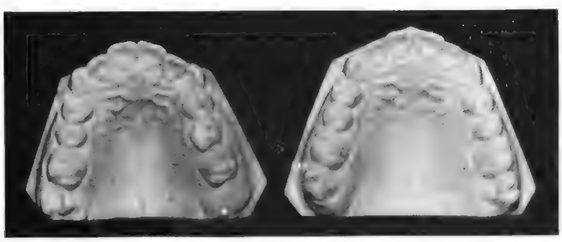

Fig. 8.

a very gradual expansion of the lower arch accompanied by vigorous and systematic exercise of the masseter-temporal muscles with the teeth held firmly in occlusion. A view of the occlusal aspect (Fig. 6) of the maxillary arch will be of interest to you, I am sure. Table I will give you an idea of the increased dimensions, that of the maxillary arch being of particular interest.

Fig. 7 is that of an older child, one of twelve years of age who received similar treatment, and also very satisfactory results. In reading the table of the development of the maxillary arch (Fig. 8) note the fact that under muscular

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activity we had a narrowing of the canine region and a flattening in the incisor region, thus completing a very satisfactory arch form.

TABLE II

MAXILLARY	BEFORE TREATMENT	AFTER TREATMENT	GROWTH
First permanent molar	34 mm.	38½ mm.	4½ mm.
Second premolar	31 mm.	35½ mm.	4½ mm.
First premolar	26½ mm.	30 mm.	3½ mm.
Canine	28 mm.	27 mm.	-1 mm.
Molar to central	38 mm.	39 mm.	1 mm.

I have no doubt that there are, in the practice of many, similar cases to these, which the intelligent application of muscular work will help to develop.

I should like to say before closing that from reading discussions in various magazines in which this work has been referred to I have been disappointed to find occasionally a lack of understanding of the fundamental principles. Some have asserted that this work is useful in retention only. With me I find that in the treatment of the majority of my cases this method can be used to advantage.

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RELATION OF MALOCCLUSION AND ORTHODONTICS TO GENERAL HEALTH*

By C. W. Bruner, D.D.S., Waterloo, Iowa

"IN THE whole realm of hygiene there is no one thing so important as the hygiene of the mouth." Since this utterance by Dr. Osler some ten or twelve years ago, the medical and dental professions have had abundant proof of the statement.

Mouth hygiene is dependent in a large measure upon the normal development and efficient functioning of the teeth and their associated parts. The greatest degree of efficiency in the functioning of the teeth and their associated organs is attained in a well balanced normal development of all the bones and soft tissues of the face and mouth, thereby establishing a normal occlusion of the teeth.

Reasoning from these premises it may be understood that any deviation from the normal in the development of the teeth and their associated organs which results in a malocclusion of the teeth may become a barrier or a menace to the general health.

Normal occlusion is defined by Dewey in "Practical Orthodontia" as, "the relation of the inclined planes of the teeth, as intended by nature." "Malocclusion is a deviation from the normal to such an extent as to interfere with the functions of the teeth."

Orthodontia being that science which deals with the malocclusion of the teeth, the correlation of orthodontia to general health should at once become patent to all practitioners of dentistry, and especially, should the orthodontist consider his field so broad as to include the consideration of the general health, in the diagnosis, treatment and prognosis of the cases coming under his care.

That the all too common thought of "straightening teeth," for esthetic reasons only, possesses the mind of the laity, and we fear, the general practitioner of dentistry also, is regrettable. However much the physiognomy of the human face may be beautified by orthodontic procedure, in any case of malocclusion it should be remembered that the normal development of the mandible and maxillary bones and the establishment of a normal occlusion of the teeth is fundamentally essential also to the development of a strong healthy body.

In his text on Practical Orthodontia, Dewey describes the forces of occlusion in the order that they make their appearances during the time the dental apparatus is developing, as follows: Normal cell metabolism, muscular pressure, force of inclined planes, normal proximal contact, harmony in size of the dental arches, and atmospheric pressure. Since the functioning of all the organs of the body is essential to health, and each individual organ functions normally

*Read before the Alumni Society of the International School of Orthodontia, Kansas City, Mo., July 14, 1921.

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only as the cells of that organ develop in a normal physiologic manner, it then follows that normal cell metabolism becomes the important factor not only in the forces of occlusion, but in the development of the entire body; thereby establishing a most definite relation between the occlusion of the teeth and general health.

While recognizing the effect upon the occlusion of the teeth, of general ill-health during the early life of the child, when the teeth, the mandible, the maxillary, and other bones and tissues of the head and face are in the formative state, we shall, in this discussion confine our remarks more particularly to the effect of malocclusion upon the health, as evidenced through the aid of models, and x-rays in the clinical experience of the writer in his private practice.

In the general practice of dentistry we are in these latter days frequently called upon to diagnose, or to assist in the diagnosis of general systemic complications through an oral examination. The advent of the x-ray in the making of such examinations has proved a boon to the professions of medicine and dentistry and to humanity.

Often the x-ray reveals conditions of unerupted, retarded and impacted teeth, which under the accepted definition of occlusion, constitute malocclusion of these teeth; which malocclusion is, or may become a serious menace to the health and life of the possessor. And yet, how little does the average general practitioner of dentistry think of the possible handicap to his patient, of such an unerupted, or impacted canine, premolar or third molar tooth.

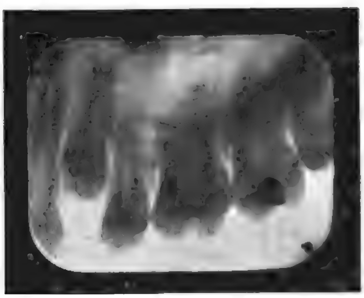

Fig. 1.—Case I. Radiogram. Note the low maxillary sinus and the broken continuity of the floor of same about the root of the first premolar.

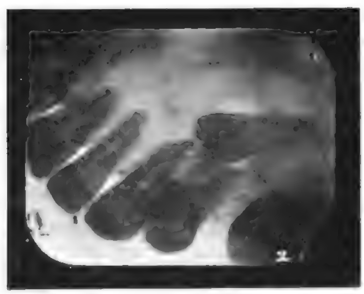

Fig. II.—Case II. Radiogram, showing impacted second premolar, and root absorption of the left central incisor, right central, lateral, canine and the first premolar teeth, together with the necrosed area extending well up into the palatal bone.

A few models and x-rays with the case histories are illustrative of our thought along this line.

Case I.—A young lady of twenty-three years, suffered three years of neuritis of the neck, shoulder, arms and hands. Several recurrent attacks necessitated giving up all work at times. Medical treatment gave but temporary relief from excruciating pain. The x-ray revealed (Fig. 1) an impacted maxillary first premolar, and an infected third molar on the right side. The premolar was extracted giving temporary relief. Later the third molar was extracted and empyemia of the maxillary sinus was treated through the molar socket. A subsequent naso-antral operation by a specialist resulted in complete recovery.

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The clinical history of this case leads us to conclude that the primary source of the antral infection was found in the impacted premolar tooth, with its concomitant abnormal cell metabolism and consequent lack of normal development of the naso-maxillary bones and contiguous soft tissues. An early discovery of the tardy eruption of the first premolar tooth and the application of the proper orthodontic stimulus to this tooth and its associated parts, might have resulted in its eruption into the normal position and saved the tooth to a life of usefulness, and its owner several years of suffering, loss of time, and much expense.

CASE II.—Miss F., a young lady twenty-three years old, was referred to me by a fellow dentist for examination. Emaciated and anemic, she entered the office supported on the arm of her sister. She had been in declining health for two years; had visited her dentist on several occasions to inquire about a certain swelling in the palato-maxillary region. Through visual and digital examination a diagnosis had been made of an impacted second premolar tooth. The x-ray (Fig. 2) confirmed this diagnosis and revealed apical root absorption of the first premolar, canine, lateral and central incisors, and necrosis of the palatal and maxillary bones in the surrounding area.

The family history in this case was negative; the parents, brothers and sister, being physically well developed, and robust in health, and so far as we were able to learn, each had what we might call a general average development of the teeth and associated parts. From a health viewpoint the case is clearly one of autoinfection from necrosis, caused primarily through faulty cell metabolism and consequent lack of proper development of the second premolar tooth and the contiguous bones and soft tissues.

Like the case reported above this young woman might have been saved long years of suffering, the loss of five or six teeth, if not life itself, by the early recognition of the unerupting tooth and the timely and proper application of orthodontics.

A case of more than passing interest is reported by Dr. W. H. DeFord, of Des Moines: A daughter of prominent people of Des Moines became violently insane and was sent to our state hospital, where she was treated for several years. At times she improved sufficiently to be permitted to go to her home. On one of these visits to her home her parents consulted Dr. DeFord. A dental radiogram was made which revealed an unerupted, impacted mandibular third molar. The offending member was extracted with speedy and complete recovery from the mental aberration.

While the anatomical relation of the impacted mandibular third molar to the other teeth may not be considered a malocclusion and is, in many cases, not amenable to orthodontic treatment, yet, it is decidedly a malocclusion of a severe type, and very clearly, in this case it did have a definite relation to the health of the possessor.

Reference has been made to the importance of early recognition of malocclusion in order that timely correction may be made. "An ounce of prevention is worth a pound of cure." To no phase or department of human endeavor is this time-honored truism so applicable as in the care and treatment of

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the human teeth. Especially does this apply to correction of malocclusion of the teeth.

Case III.—The orthodontic appliances had been adjusted and treatment had progressed some three or four weeks when the operator was stricken with a siege of fever necessitating his absence from the office for a month. During this interim the case was cared for by a fellow-dentist who, on our return to practice, returned the case to us.

As will be seen from the models (Fig. 3), the case was one of a lad of ten years. On our taking up the work following illness our troubles began. Inattention to appointments, lack of interest and adverse suggestion and criticism were indulged in by our patient. This seemed to be a reflection of parental sentiment, and altogether the toxic mental effect of maltreatment during our absence from the case. The child, parenthetically, was too young for treatment.

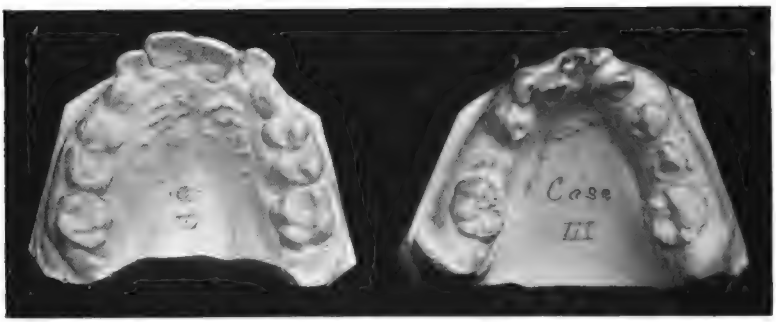

Fig. 3.—Case III. Showing occlusal view of teeth before treatment.

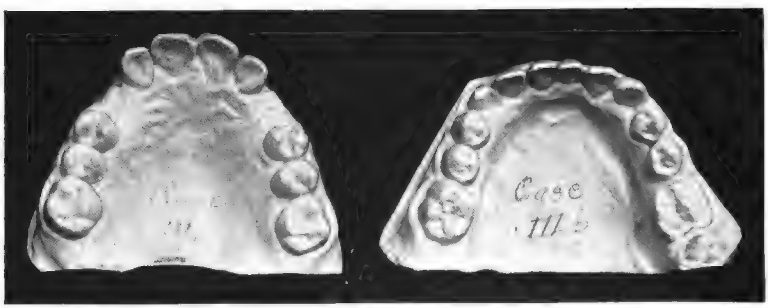

Fig. 4.—Case IIIb. Showing occlusal view after treatment. Note the maxillary spaces for unerupted canines, also the increased lateral diameter of the mandibular arch which, measured from center to center of the mesial sulci of the first premolars, is 12 mm.

The models and a letter setting forth our difficulties in the handling of the case were sent to Dr. W. J. Brady, then head of the Orthodontic Department of the Dental College of the Iowa State University, with the request that if we were scientifically wrong in undertaking treatment of the case at that tender age, we wished to be put on the right track, at the hazard of our reputation and loss of the case with all it meant to us in getting started in a new field of practice.

The return of the models and a three page, single-space typed letter setting forth the scientific reasons for early recognition and treatment of malocclusion so influenced the father of our little patient that we were enabled to carry the

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case to completion with no further objection on the part of patient or parents. (Figs. 4 and 5.) That the sentiment prompting and responsible for our difficulties in the treatment of this case has been quite general to the dental and medical professions, and to the laity is evidenced by the fact that the mother was an intelligent woman, the father a prominent physician and the other dentist in the case, a man of some considerable experience in the general practice of dentistry.

In the consideration of malocclusion, the thought should ever be kept in mind that we are not mere "straighteners of crooked teeth," or yet, operators

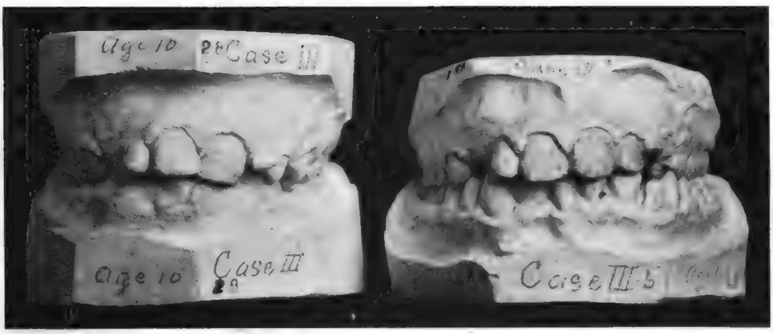

Fig. 5.—Case III. Showing mandibulo-maxillary relation of the teeth before and after treatment.

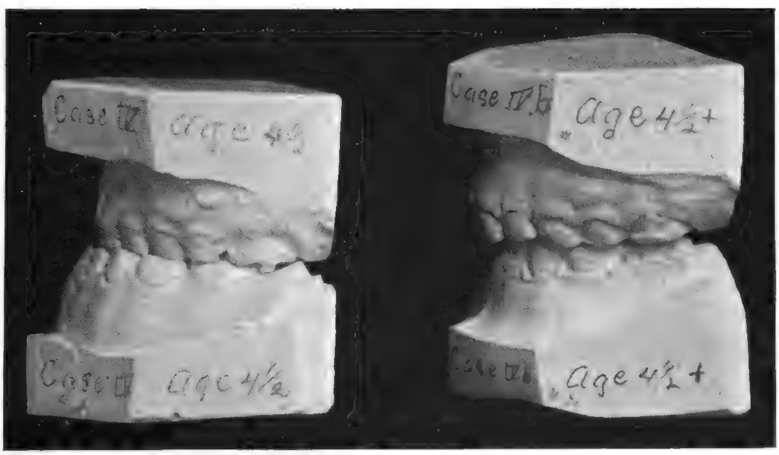

Fig. 6.—Case IV. Note the mesial relation of the mandibular teeth and the normal relation after treatment of three weeks' duration with expansion arches and intermaxillary rubber ligatures.

of beauty parlors. Back of, and paramount to the mechanics of Orthodontia, or the mere appliances used in the correction of malocclusion is the principle of normal cell metabolism. The gentle stimulation to normal physiologic action of the tissue cells of the teeth, and surrounding structures at the time and age of the normal development of such teeth, and their surrounding structures is really and truly scientific.

Corrective measures undertaken during the developmental period of the bones of the face and jaws are carried to completion in far less time with less difficulty, and with infinitely greater chance of success.

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Case IV.—Models before and after treatment of a little girl four and one-half years of age illustrate the above point very nicely (Fig. 6). Models marked No. 1 showing decided mesioclusion of the mandibular teeth. Models No. 2 show correction at the end of three weeks. While we cannot insure a normal occlusion of the permanent teeth in this case we do know that a radical interference with the normal development of the maxillary and other bones of the face is removed and that these bones and the facial outline have a far better chance of normal development and harmonious relation than before. Also we have removed the handicap to normal physical development and possible ill-health through contraction of the dental arch resulting in a narrowing of the

Fig. 7.—Case V. Showing occlusal view before treatment.

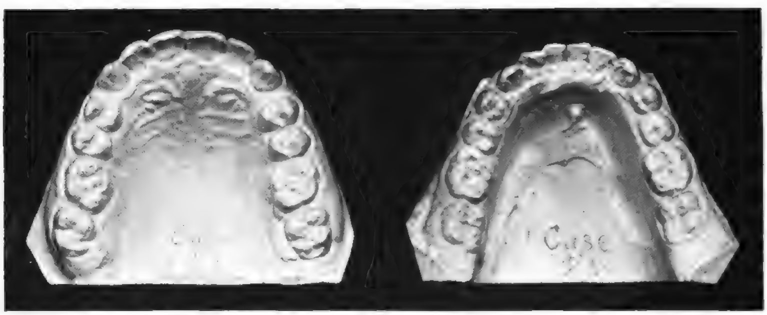

Fig. 8.—Case Vb. Showing occlusal view after treatment. Note the increased lateral diameter of maxillary and mandibular arches. Maxillary arch expansion 6 mm. Mandibular and expansion 6 mm.

nasal passages with a possible consequent growth of adenoid tissue, mouth breathing, improper aeration of the lungs, etc.

The result certainly justifies the effort. It pays.

Case V.—Models before and after treatment of a girl, ten years of age, (Figs. 7 and 8). The second eldest of a family of five girls. At five years of age there was evidence of adenoid tissue and an operation for this was performed. Between nine and ten years of age she developed ill health, became anemic and hollow chested and fell behind her class in school. The family physician pronounced it a case of developing tuberculosis. She was taken out of school. Rest and diet were prescribed. Mouth-breathing had become a fixed habit. Pacifier had been used in early childhood. When referred to us an exami-

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nation of the throat was recommended. Recurrent adenoid growth was found and removed. Model No. 1 Fig. 9 shows malocclusion three weeks after this last adenoid operation. Orthodontic appliances were adjusted and the case carried to completion, as shown by models No. 2, (Fig. 9) in about a year and a half. Rest and diet were continued, during the treatment of the case.

Within a month after the beginning of the correction of the malocclusion she began to show a slight improvement in health. She was also instructed in deep chest breathing. Gradual increase in weight and development of chest was observed. The habit of mouth-breathing was gradually lost. With no other

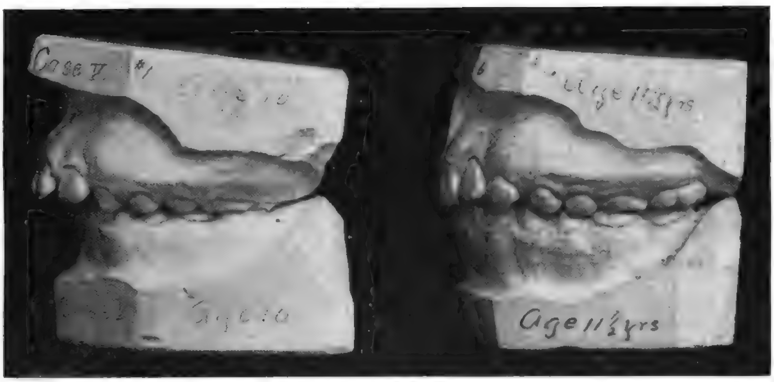

Fig. 9.—Case V. Showing distoclusion and correction made in one and one-half years.

Fig. 10.—Case VI. Note artificial restoration of maxillary incisors attached to gold crowns on the canines; note also the loss of the mandibular second premolar and second molar on the right, and the second premolar and the first molar on the left side with consequent migration and tipping of the remaining molars and the general mutilated malocclusion.

than the above treatment, she had at the end of about one year and a half, developed a good healthy complexion, a full round chest with good lung expansion. She had returned to school and caught up with her class.

Today, about five years since the completion of the case and the making of the final models, she appears as well and strong as any young lady of her age. She has recovered from the mouth-breathing habit, except when having a cold. She has done good work in the grades and high school, and is really quite athletic in appearance and action.

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Case VI.—Figure 10 gives the models of a woman about 35 years of age. These models show a mutilated case of malocclusion through indiscriminate extraction of the permanent teeth and a long delayed substitution of bridges.

Indigestion, anemia, and general ill health were present to a marked degree. How much the malocclusion had to do with the health condition none of us can say. We may, however, reasonably presume that with the retention of the natural teeth in a healthy condition and a normal occlusion the patient might have enjoyed good health to a much larger degree.

Case VII.—Fig. 11 shows models of a young woman twenty-one years of age. She was weak and anemic, being the victim of serious complications of

Fig. 11.—Case VII. Showing mandibulo-maxillary occlusion, with missing maxillary lateral incisors, and canines contacting with central incisors.

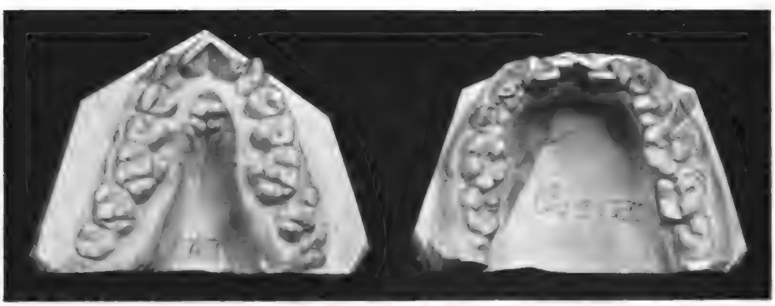

Fig. 12.—Case VII. Showing occlusal view of maxillary and mandibular arches. Note the extreme narrow maxillary arch, center to center of the first premolar mesial sulci 21 mm., with apparent broad mandibular arch and bunching of incisors and canines. Note also the high, V-shaped arch, measuring from the occlusal plane of the first molars to the palatal vault 22 mm., with a lateral diameter of 12 mm. between the mucous surfaces of the alveolar ridge at the mesial angle of the first molars, and 8 mm. directly above and 1/4 of an inch below the summit of the palatal vault.

the vicious circle; with badly infected and enlarged tonsils and an enormous growth of adenoid tissue. She was also becoming quite deaf. Note the extreme high vault and narrow arch in maxillary region and the wide arch and overlapping of anterior mandibular teeth. (Fig. 12.)

Through the courtesy and influence of the medical specialist who was treating this case and who called us to assist in the operation of adenectomy, and tonsillectomy, we were able to procure these models, and to keep in touch, to some extent, with the history of this case subsequent to the operation and

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treatment, and the making of our models, in the summer of 1908. For a period of several years following the initial operations by this specialist the patient returned at more or less frequent intervals for the treatments of ear, nose and throat lesions. At the present time, we learn she is enjoying fairly good health, although no correction of the malocclusion was ever undertaken.

We may safely assume that any degree of health she does enjoy may be attributed primarily to the fact that she belongs to a family of very healthy, hardy people, who live on a farm, where plenty of fresh air and wholesome food is obtainable. At thirty-four years of age she is not married, and no doubt living an unhappy life because of a physical handicap of malocclusion of the teeth, facial deformity and concomitant ills, due to abnormal cell metabolism in the developmental period of her life.

In concluding these rather rambling remarks on the interrelationship between the general health and malocclusion of the teeth, the one thing I would emphasize, and endeavor to impress upon your minds, is the importance of the recognition, in the early life of the child, of malocclusion of the teeth or any developmental deficiency tending toward such malocclusion and the application of proper remedial agencies during the formative period of growth.

To this end I would recommend a hearty cooperation with our brothers of the medical fraternity in the matter of dietetics and all such matters as pertain to the general health of the little folk coming under their and our care.

For the inspiration and assistance given to me in many vexing problems that have arisen in my somewhat limited experience in orthodontia in connection with a rather busy general practice of dentistry, I desire to pay a tribute to my old time friend, our beloved dean, Dr. W. J. Brady.

A very busy man we all agree. But never too busy, or so much engrossed in his own private practice, and close connection with work in colleges, and as official head thereof, to find time and delight in listening to and answering the Macedonian call, "Come over and help us."

For his helpfulness to the dental profession of my own state and his many courtesies and assistance to me personally, I desire to thus publicly thank him.

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THE BEST AGE FOR TREATMENT IN RELATIONSHIP TO RETENTION*

BY GEORGE NORTHCROFT, L.D.S.

IT MAY be remembered that Gobind, the one-eyed, told Kipling that "when man has come to the turnstiles of Night all the creeds in the world seem to him wonderfully alike and colorless," and, I confess, there are models in my collection that seem to prove and disprove any dogma.

Recently we have been told that this Society narrow-mindedly confines itself to questions of treatment which remain unanswered, and which merely end in futile and unproductive discussion; that we lack guiding principles except of the most elementary kind. One would have thought that listening to such authorities as Keith, Mellanby, or J. F. Colyer, showed our hunger for establishing fixed principles on the broadest lines, that this is that road to successful treatment which all of us are striving to find, and to the vast majority it is the attainment of this goal by ourselves, for the public weal, that leads to a participation in the profession at all. After seeing the display of many interesting treated cases one came away with the impression that one principle had been forgotten that we thought had been established years ago, and should now be taught to, and known by, the profession at large—that is, the necessity of commencing treatment at an age so young that gross irregularities have not become established; at an age when growth is more certain of taking place, and probably only needs the right stimulus, whether mechanical or physiological, or both, to produce normal results. It is the apparent necessity of repeating this oft-told tale that has caused, in all too short a time, the preparation of this paper, and when leisure is obtained to go more thoroughly through models, now numbering some two thousand, it is hoped that some statistical results may be produced of lasting value.

J. E. Spiller, in March, 1913, answering the question, "at what age to commence treatment of postnormal cases," with characteristic modesty said "he did not know," but gave many cogent reasons for selecting *eight* as the ideal age. The same age would seem to apply to neutroclusion, possibly a little later, eruption is such an uncertain factor. Prenormal cases, if anything, should be taken earlier. What should be insisted on is the principle of early treatment, and from observation of a series of models of the same mouth taken over successive periods, it can be proved that when once an abnormal condition exists, that condition becomes progressively worse up to the maximum at which stable equilibrium is established between all the forces of development, non-development, muscle pressure, air pressure, etc., and therefore, as far as practical, treatment should commence when abnormal conditions are at their minimum.

*Read before the British Society for the Study of Orthodontics, March 9, 1921.

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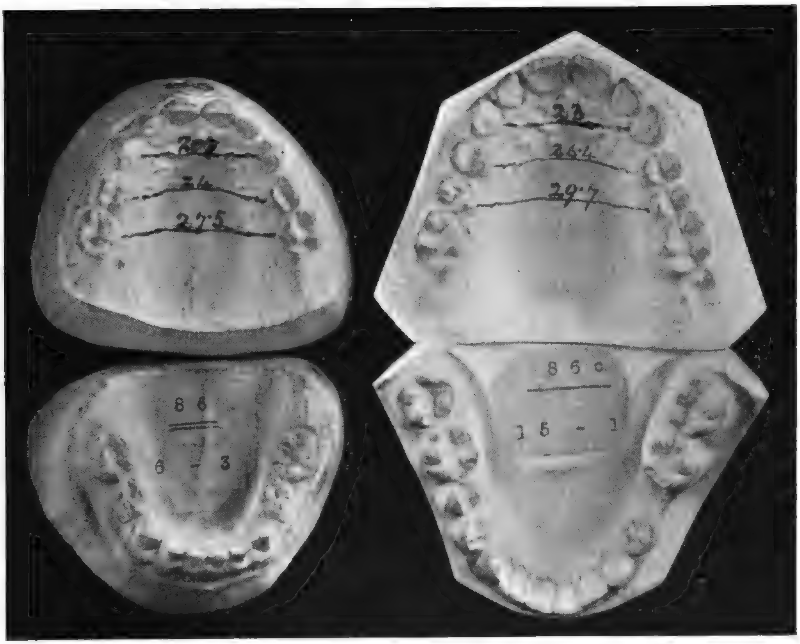
Now we do not always learn the most useful lessons from treated cases, but sometimes from those cases that might have been treated, and can then study at what age simple cases become complicated. For many years the writer has advocated securing models of all the children in one's practice so as to visualize how far Nature is helping the developing jaws and when, and how much, outside aid must be sought. This implies that every dental surgeon should be an orthodontist, and that this aid to diagnosis which the specialists could obtain rarely otherwise, would release him from having extremely complicated cases to treat at all, if only mouths were looked after and cases treated in time.

The vexed question of retention was dealt with in a paper read at the International Dental Congress of 1914, but other vexed questions have loomed



larger since then, so that it might be prudent to recapitulate the conclusions then reached. The time factor varies from no time at all in "natural retention" to four years, and even permanent retention. No data are available to guide us as to how long any particular type of case should be retained. Cases commenced at eight years should certainly be watched till ten or even later, especially when there is lack of development in the canine region.

There has been no time to make lantern slides for the purpose of this paper, but I would impress on the Society the necessity of having all communications lavishly illustrated, as it thereby renders such communications so much more interesting and intelligible.

1. Case 86. Female six years. Normal anteroposteriorly, but apparently no spacing taking place, therefore, according to Bogue, should be expanded. Marked "to be watched."

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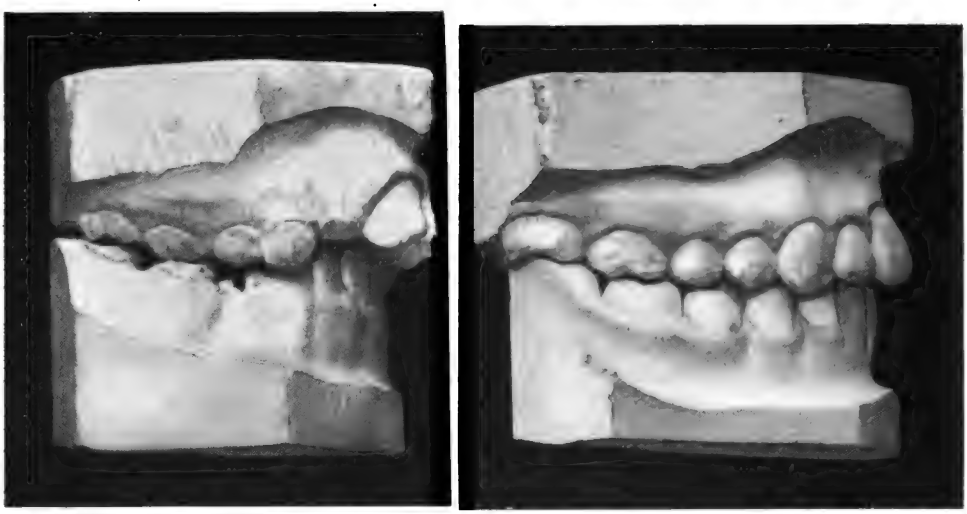
86c. 15.0. 86a and 86b showed that no treatment would be necessary. Shall we say perfect occlusion? Nature has done everything necessary. Note "small teeth in large jaws." Very late eruption of $\frac{7}{7}\mid .\quad\mid\frac{7}{7}$ not yet in occlusion. Foreshadowed imbrication of $\overline{\mid 2}$ in Model 86a entirely disappeared. Palatal measurements:

c | c	20.7	3 | 3	23.
d | d	24	4 | 4	25.4
e | e	27.5	5 | 5	29.7

The average natural increase in palatal dimensions is nearly 2 mm.

This shows the wisdom of waiting till 8 years old to see if development is normal according to type.



2. Case 299. Female 7.3 years. Bottle fed. Partly mouth breather, no adenoids. Mother postnormal.

Double postnormal $\frac{\quad\mid e}{edc\mid e}$ septic and removed.

299b 7.6. I.M.T. applied. 8.3. Elastics only worn at night. Lower lingual arch. 9.10. Apparatus removed.

299j. 14.0. Occlusion normal. Note $\overline{\mid 5.}$ This case shows the result of treatment commenced at an ideal age, retained by decreasing mechanical force over a considerable period of time—two years and four months.

3. Case 303. Female five years. Adenoids removed at this age. Note postnormal occlusion on right side, slight proclination of maxillary incisors, with lower center, half a tooth to the right. Does this mean a congenital defect, moulding during birth, finger-sucking? Normal growth presumably taking place judging by spaced incisors, no earlier models available to check this observation.

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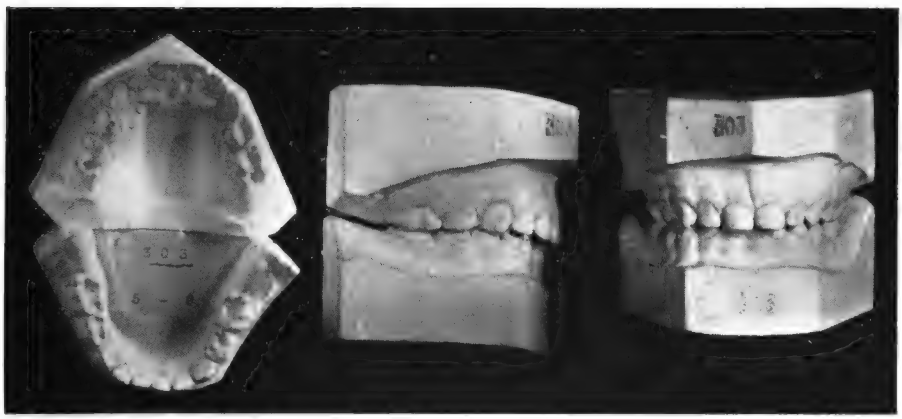
303b. 6.6. There is an interesting attempt by Nature to correct prenormal condition of 6 | by forward thrust of 6 | , c | having been pushed out of the arch. *But* note the impacted condition of 6 | 6 actually causing absorption of e | e, denoting faulty development of maxilla and its sinuses. It is in these cases that tilting back the 6 | 6 by intermaxillary traction would probably prove successful, the cases successfully treated by this method have not been seen at this age, and therefore the method has been advocated for treating all so-called postnormal conditions.

303c. 7.10. Center nearly normal. Nature has at this age produced her maximum effort at correction, and unaided will be seen to fail in the fight for symmetry and beauty.

303d. 8.1. Even in three months the centrals have inclined further forward, space forming for 2 | 2.

303e. Was sent away to another practitioner with suggestions for treatment.



303f. 11.1. Three years later. Note peg-shaped 2 | rotated | 2 and e | e have been forced out, not extracted, it is therefore a case of "self-mutilation." 5 | has been pinched out on right side, but is present, probably in palate, and | 3, according to x-ray, is erupting in palate. Note rotated 3 | . Prenormality much worse.

303g. 12.10. 7/7 | 7/7 erupted, fully developed prenormal 6 | 6. | 3 still unerupted, 5 | in palate and | 2 rotated. This condition could have been easily corrected at 8 years old, and should never have been allowed to become progressively worse.

4. Case 144. Female 5.4. Mouth breather. Reported no adenoids.

144a. 5.10. Note early eruption of 1 | 1. Started expansion at 6.9. 21 | 12 a straight line owing to lip pressure.

144f. 7.1. Apparent maximum expansion obtained in four months. Retention plate inserted.

144k. 7.11. Slight collapse noted. Upper and lower expansion plates again worn, and retention continued with changing plates as various temporary teeth were lost. Retention was prolonged until 11.0 as mouth-breath-

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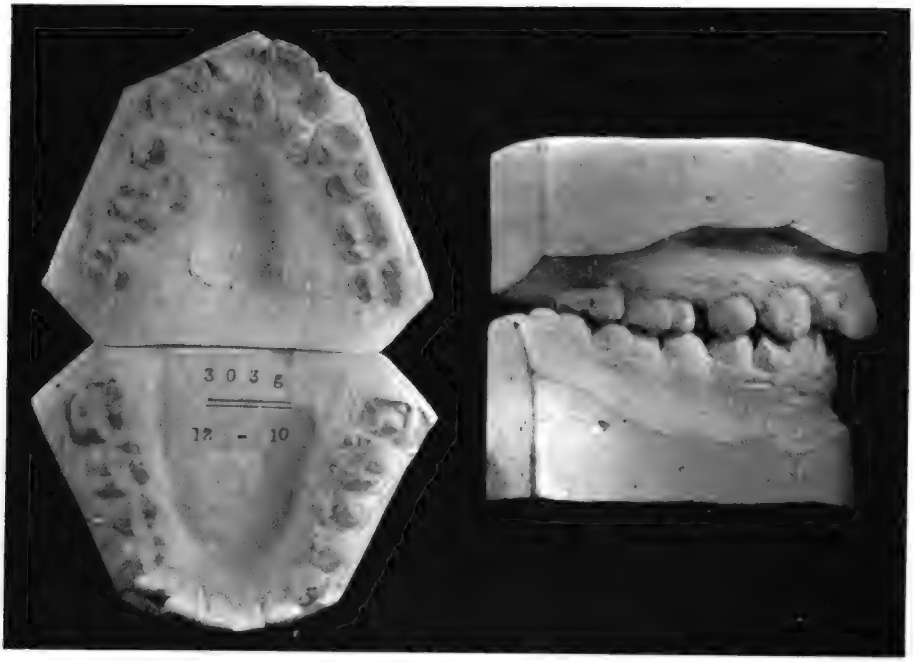

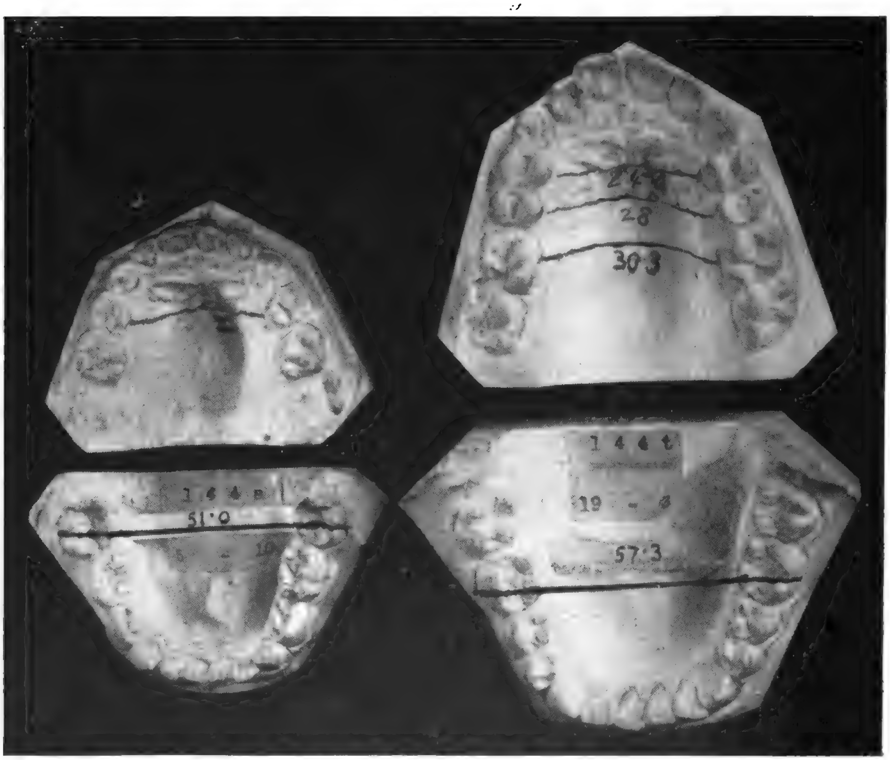

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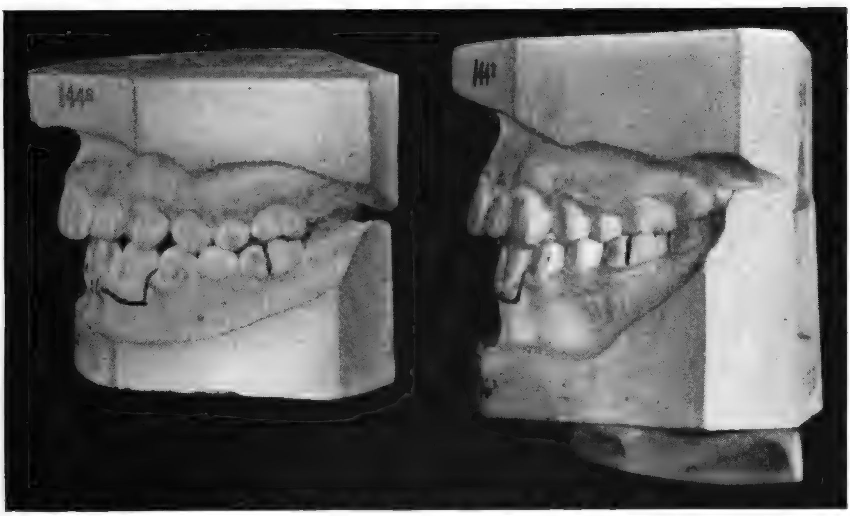
ing persisted; but at this time it was supposed normal bone growth had taken place.

144r. 12.6. An interesting, and it is believed an original, observation now comes into play. The bucco-lingual diameter of d | and | d is 8 mm. The bucco-lingual diameter of 4 | and | 4 is 10 mm.

144k. =	8	29	8 = 45
144r. =	10	25	10 = 45

From the palate measurements it looks as if the expansion has collapsed; in actual fact outside measurement shows that buccal pressure has not resulted in collapse.

All this time the mandible has been steadily growing, and what looks like a maxillary relapse is in reality a continued buccal growth of mandible up to 19.3.



144s. 13.7. The greatest buccal widths at c | c and 6 | 6 for 144a are 28 mm. 51 mm.

144t. 19.3	144k are	31 mm.	53.7 mm.
	144r "	32 mm.	55.5 mm.
	144s "	32.4 mm.	56.4 mm.
	144t "	33.3 mm.	57.3 mm.

Total growth of maxilla at 4 | 4 is 6 mm. Total growth of mandible at 3 | 3 is 5.3 mm. and at 6 | 6 is 6.3 mm. Probably stable equilibrium is now established.

One can, of course, only picture what this mouth might have been like if no treatment had been undertaken.

5. Case 220. Male 3.3. Adenoids. Warned parents.

220b. 5.11. 6.1. Lower 1 | 1 erupting distally. Adenoids removed.

220d. 6.11. Double postnormal. Imbrecated lower incisors.

220f. 7.10. 1 | 1 rotated. Lower 21 | 12 worse. Treatment advised. 7.11. Expansion plate inserted.

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220j. 9.6. Expansion obtained 9.4 mm. Postnormal. Cured.

220k. 9.11. Plate abandoned 9.9, collapse commencing it was recognized that the case had been overexpanded, and this was expected.

220l. 13.4. Expansion collapsed 3 mm. Total expansion retained 6.4 mm.

220m. 15.3. Treated on exactly the same lines as previous case, but in the former adenoids were not removed and mouth breathing persisted, and unless equilibrium is established nothing but permanent retention would avail.

6. CASE 258a. 2.8. Prenormal. Whether congenital or acquired is doubtful. | a erupted first. Palatal width d | d 24.5 mm. Treated 2.11 to 3.3. Natural retention.

258f. 12.6. Bite normal. Natural expansion 2.5 mm. Width between 4 | 4 27 mm. Very early treatment was certainly successful.

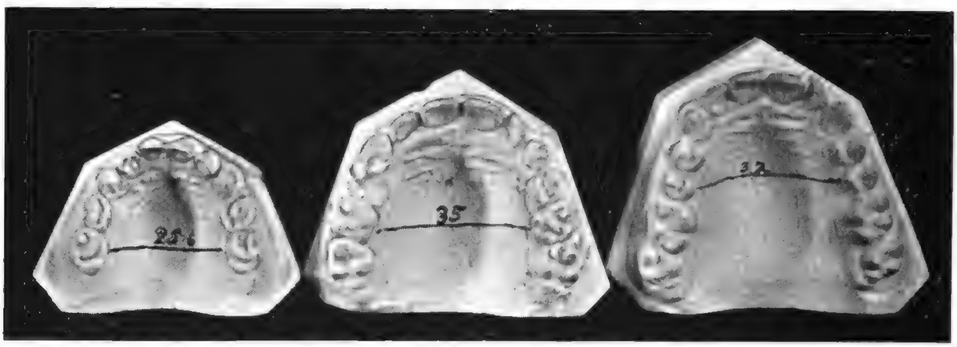
7. CASE 191. Male. Untreated case. Shown in contrast to previous one.

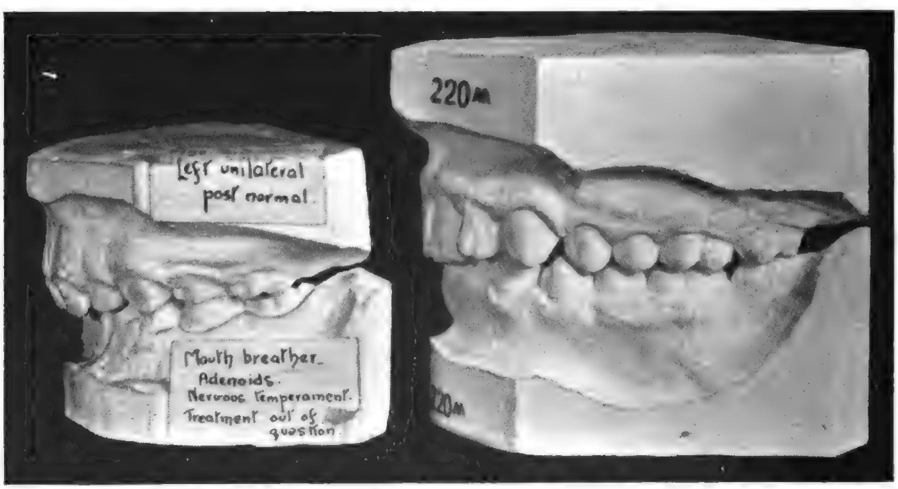
191b. 2.7. Crowded incisors. Supplemental | c. Needs expansion later. Mouth breather. Reported no adenoids. $\frac{e \mid e}{e \mid e}$ unerupted at this age.

191g. 5.4. Supplemental | c removed at 3. ba | ab more crowded.

191j. 7.4. Hypoplasia and retarded eruption 6/6 | 6/6. Palatal width between d | d 25.5 mm.

191l. 14.7. Note collapse of upper arch 2 mm. at 4 | 4. Adenoids re-





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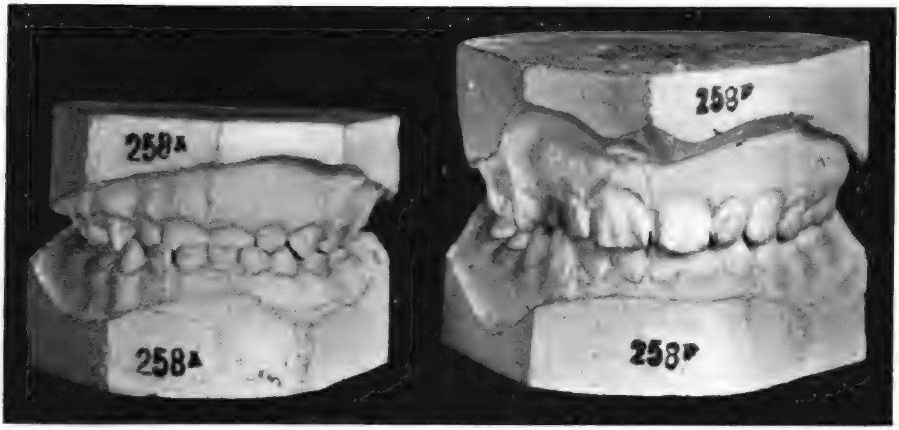

moved at eleven years, too late to effect development of maxilla. Complications gradually increasing.

X-ray shows 5 | missing, | 5 pinched out of arch by forward movement of | 6. Supplemental | 3 with | 3 buried in palate.

Female. The buccolingual diameter of d | and | d is 9 mm. The buccolingual diameter of 4 | and | 4 is 9.4 mm.

$$\begin{array}{llll} 191j = 9 & 25.5 & 9 & = 43.5 \\ 1911 = 9.4 & 23.5 & 9.4 & = 42.3 \end{array}$$

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Showing 1.2 mm. natural contraction between 11.0 years, when adenoids were removed, and 14.0.

It is hoped that the analysis of the seven cases shown tonight, the simplicity of the treatment involved and the not unsuccessful results of that treatment, will help to establish the principle that treatment should be begun about the age of eight, and that retention should be continued until a reasonable time has elapsed for bone to grow and muscle stresses to become balanced. That if a relapse of expansion does take place it will leave the case, at any rate, much better than if no treatment had been attempted. Leaving cases till a later age can but make the treatment harder, more painful, more prolonged, and a successful result more doubtful.

Harold Chapman, L.D.S.Eng., D.D.S.Penn.:

You will remember that at our last meeting one member proposed that the discussion of Mr. Cale-Matthews' paper be continued at this meeting, and it seemed a desirable course in view of the interest it aroused. It will also be remembered that several who took part in the discussion of the paper were reminded that they were speaking away from the subject indicated in the title of the paper. I personally sympathized with those members, as the latter part of the communication tempted one to digress. This evening, Mr. Northcroft's paper has widened out the scope for discussion, and we must all feel grateful to him for the opportunity he has afforded us of continuing part of the discussion of the February meeting, as well as for his most excellent paper, which is of such practical value and is based on his experience.

The title of Mr. Northcroft's paper is such that it made an impression on me; I wondered what was the significance of the last four words: "in relationship to retention." Why was the essayist not content to discuss the best age for treatment? Undoubtedly he wished to emphasize the importance of retention, for it can be of little value to move teeth if they cannot be retained—we know quite well that teeth can be moved at any age, but up to what age they can be moved and will stay in their new positions, after a definite period of retention—without (artificial) permanent retention—is unknown, as far as I am aware.

The writer of the paper has shown us actual cases to prove that eight years is a good age for treatment and we must agree that he has succeeded. Yet on theoretical grounds I think a much earlier age might well be chosen, and on practical grounds I believe that treatment should be undertaken earlier than has been advocated; in fact I would say that any abnormality should be corrected as soon as it arises—that is theoretically: and practically that its correction should be undertaken as soon as it is possible to treat the patient. You will say that such statements should be supported.

The experiments of Baker, of Boston, are known to you all; he took two young rabbits from the same litter; the molar series on one side of one rabbit he rendered functionless by grinding the teeth so that they did not occlude; this rabbit compulsorily masticated on the other side only. The second rabbit was kept as a control. The entire skull of the latter developed fully and symmetrically, but the skull of the former developed fully on the functional

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side, but was much underdeveloped on the nonfunctional side; comparison between the size of the zygoma and its distance from the body of the skull on the two sides may be taken as an indication of this. This is a marked and clear example of lack of function being followed by lack of development. The teeth on the one side were not used; in fact they were of no use; in consequence the muscles of mastication were not used and so the bones to which they were attached did not develop to the extent that they did on the functional side. I should mention that these rabbits were killed when a few weeks old.

I have no doubt all this seems to be rather away from the point, but now let me connect these experiments with a supposed case of irregular teeth in a patient—a case of odonto-prosopic orthopædics. The simplest one I can suggest is a typical case of Angle's Class I or neutroclusion. Such a case is an example of lack of development in every direction—laterally, anteroposteriorly and vertically; in other words the jaw bones are a miniature of what they ought to be.

We look at models of such a case; what is suggested to our minds? Irregular teeth—that is the most vivid impression we receive. We are apt to forget that irregular teeth are in ninety-nine cases out of a hundred but the visible expression of a maldevelopment of bone, just as the lateral curve in a femur or a bow leg is an expression of a similar maldevelopment. In the one the bone malformation is patent to all, the result of wrong stresses on the bone; in the other we must look at the deformity through the teeth and endeavor to visualize what the shape of the bone is and what it would have been had development been normal. In the supposed Class I case the stress was normal in direction but abnormal (insufficient) in degree. Now from Dr. Baker's experiment, it is fair to assume that not only the bones containing the teeth are maldeveloped, but also *all* the bones of the skull. Take one bone, the mandible: this is too narrow, too short, and has not enough height; the condyles are too close to one another, they are too close to the central incisors and to the mental process; the inferior borders approximate one another too much, and the vertical height of the bone is insufficient. The same applies to most of the bones of the skull—certainly to half of them if we are to place any value on the experiments I have referred to. Of course there are varying degrees of such maldevelopment and fortunately they are seldom as severe as the example referred to.

Now we proceed to treat this case of Class I; we enlarge the arch of teeth laterally and anteroposteriorly so that all the teeth may fall into good alignment; we are all agreed there is no difficulty about this, we have been shown examples of such tonight, and at the last meeting, whose ages varied from say 5 to 15 years. Having got the teeth in alignment we must again endeavor to look through them and behold the bone structures beneath. We can only assume what we should see. Suppose the abnormal bone growth to have been incited (or should I say the bone growth to have been inhibited) at 2 or 3 years of age and continued up till 8 years, when treatment is undertaken. The teeth are put in alignment as Nature intended, but are the condyles widened

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to correspond, are the inferior borders widened to correspond? The distance of the condyle to the central incisors is perhaps nearer to normal, but how about the distance from the condyle to the mental process? Say the treatment takes 6 months or a year; in that time has the lack of growth of the bones of the skull that should have occurred from 3 to 8 years been made up? These are questions of the greatest importance; the lack of growth will have been made up better than if the case had been treated at 15 years, but not so well as if it had been treated at 5 years of age. In any of these cases it is difficult for me to believe that the normal growth can ever be secured unless treatment be instituted as soon as inhibition of growth occurs, and the longer it is deferred the less the probability of getting normal development becomes, and so the less the probability of natural permanent retention. To make matters worse from the point of view of retention, the new positions of the teeth have been obtained by mechanical apparatus acting directly on them and not by bone development resulting from muscle activity. Keith says in "Menders of the Maimed": "In all deformities I believe that the transformation of bone is a direct result of defective, unbalanced muscular evidence." Whilst this sentence only indirectly supports my argument, it does so very strongly in conjunction with the whole chapter in which it occurs, and I need only add here one more line from it: "The amount of growth in a bone depends upon the need for it." Now this is not strictly true if we take the view that the growth of the jaws should suffice to contain the teeth in normal alignment, etc., but presumably it is if we take the view that the jaws are developed sufficiently to masticate the diet that the individual has consumed. For the argument to hold good it would have to apply to teeth also, *i.e.,* the amount of growth in teeth depends upon the need for them, but unfortunately such is not the case and, if it were, I imagine orthodontics would be unknown as we know it. The trouble about orthodontics is that the teeth are formed so early that their development, growth and size is uninfluenced by the work they will have to do, but the growth and size of the jaw which is to contain them is so influenced. It therefore seems of the utmost importance that all children undergoing treatment of this kind should be put on the most vigorous diet in order to ensure permanent natural retention.

I have spoken too long, but this is a question which has worried me considerably of late, and whilst one knows what good results are to be obtained at 8 years of age, and for older children, without extraction, that is not the point the title of Mr. Northcroft's paper makes, which is " the best age for treatment in relationship to retention." I should have preferred him to have fixed a younger age. The writer and I have discussed this matter many times, and I would have liked to amplify my arguments still further on this occasion, for material to do so crowds before me, but now I must content myself with assuring Mr. Northcroft of my own gratitude to him for writing this paper. The short time in which he has done it furnishes me with a weapon, which I sadly need when asking members to write papers, but perhaps now they will come forth spontaneously like teeth in an arch already crowded, but receiv-

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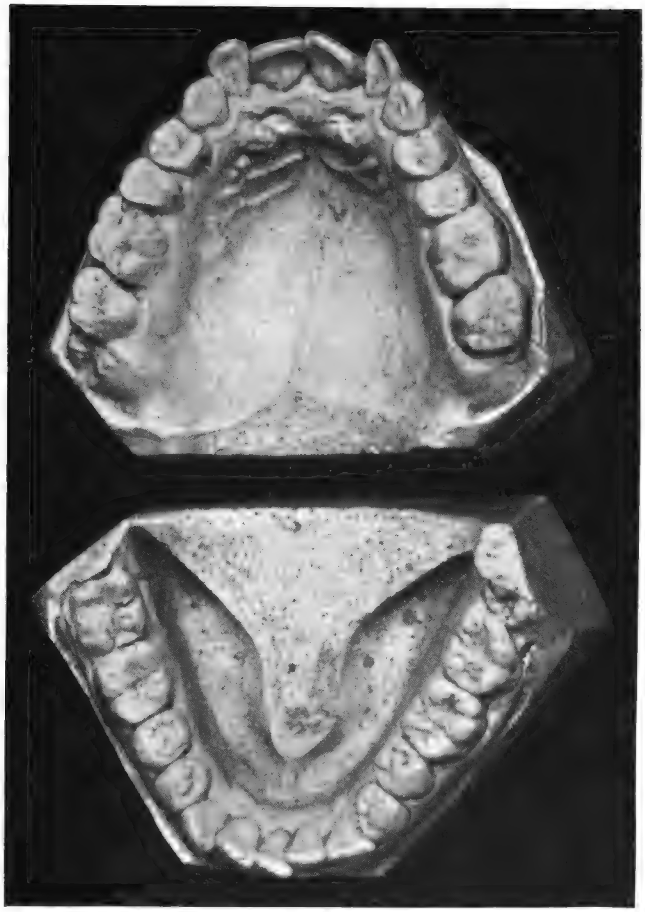
ing a warmer welcome. I shall be able to say it doesn't take long—leave the long part to those who discuss it.

ORTHODONTIC TREATMENT REQUIRED AT 23 YEARS OF AGE

Mr. F. Bocquet Bull said that this was the case of a cinema actress, who had the two upper laterals markedly outstanding, and these showed up in a very pronounced way under the light used in the cinematograph studio. The



case was quite an urgent one, because the patient told him that she had lost three contracts owing to the refusal of the producer to pass the presentation. Whatever treatment was suggested must be to a certain extent experimental because in giving treatment one might worsen the condition. He added that there was congenital absence of one of the lower incisors. He showed a model of the case.

DISCUSSION

The President said that he thought some of the most difficult cases that orthodontists had to deal with were these cases of irregularities in adults which had received no previous

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treatment or in which the treatment had been totally inadequate. They were often obliged in these cases to resort to some mechanical treatment in the form of fitting crowns rather than adopt an ordinary orthodontic procedure. It was a matter of considerable urgency to a patient like this, who was unable to follow her profession on account of her appearance.

Mr. G. Northcroft said he thought that orthodontic treatment as commonly understood was out of the question. This was, on account of the time which would be taken and the serious interference with the pursuit of the patient's profession, making it unadvisable at that late age, to undertake the correction of the irregularity by ordinary means. The case was complicated by the congenital absence of one of the lower incisors, which would make the question of retention an extremely difficult one, and probably unsuccessful in the end. He would, therefore, suggest crowning these teeth. In America he had no doubt that many men would suggest "jacket crowns," thereby dodging the danger of apical infection. Otherwise one had to take the responsibility of destroying the pulps of these teeth, but in this case, the patient was aged 23, and therefore not likely to be a cinema actress for more than ten years longer, if one was successful for at any rate ten years, one might be justified in cutting off the teeth and crowning in the ordinary way. This was on the supposition that Mr. Bull did not see his way to making porcelain jacket crowns. The speaker had made some, but they were difficult, and he thought that in the confined space with which Mr. Bull would have to work, as shown in these particular models, the jacket would be so extraordinarily thin as to make the procedure almost impracticable. Therefore he would be in favor of devitalizing the teeth and crowning them. The next point to be considered—and it would be extremely interesting to hear from other members who had experience—was with regard to the liability of artificial teeth to show black on the screen. That had been his own experience with a patient who was a screen actress. But he could not be certain whether these particular teeth were Ash's or American. The teeth should be crowned with the dowel or Logan type, where one had a large thickness of porcelain very highly translucent, which probably would not give black shadows in very strong light. He would suggest that Mr. Bull should get a model or patient with some American porcelain teeth screened as an experiment.

Mr. W. Rushton said that some years ago Mr. Samuel Headley published a number of cases in which he performed orthodontic treatment for adults up to 30 years of age. There was not the slightest doubt that if the first premolar were extracted on either side, these teeth would be perfectly regular. Whether that would take too long, in view of the lady's professional engagements, he could not say. That was for her to decide.

Mr. Bull thanked Mr. Northcroft for his suggestion which he thought was probably the one he would adopt, and the one he had in view. With regard to Mr. Rushton's suggestion to extract the two premolars, he thought that probably any treatment which that would involve would be too long; also it would be perhaps something of a calamity if one did not quite succeed, for the unsightliness might be only slightly shifted, and he presumed that when these cinema actresses smiled, they smiled to the fullest extent. On the whole he was rather inclined to Mr. Northcroft's opinion.

DISCUSSION ON MR. NORTHCROFT'S PAPER

The President said that the Society owed very much to Mr. Northcroft for the valuable work he had done for it in the past, and tonight those present would all agree that the debt had been increased by the paper which he had just presented. They could not help admiring the really beautiful models which Mr. Northcroft always brought forward when he showed his cases at the Society meetings. He (the President) thought that Mr. Northcroft had demonstrated very clearly the great importance of the early treatment of orthodontic cases. As Mr. Northcroft had said, they might possibly learn more from observing the results in cases which had not been treated than from those which had been dealt with successfully. He would certainly strongly support his plea for the taking of models very early in childhood. Models should be taken and occlusion recorded at the earliest possible moment of all children who came under their care, and they must remember, as Mr. Northcroft has already mentioned, that in the normally developed jaws of a child of

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five the temporary teeth should be spaced, and, moreover, that there were other changes taking place, apart from the spacing of the teeth, which indicated the growth of the jaw. There was, as had been observed by others, an alteration in the relationship of the mandible to the maxillæ, and frequently, just previous to the eruption of the first permanent molar, the incisors tended to occlude edge to edge instead of posteriorly, and this edge to edge occlusion, which was the result of the growth of the jaws, did control considerably the conditions with which orthodontists had to deal in the future. With regard to Case 1, which Mr. Northcroft rather hinted as being a case which tended to disprove Dr. Bogue's view that the absence of lack of spacing was not necessarily an indication of a tendency to orthodontic deformity in the future, he (the President) thought that perhaps one might suggest that in that particular case orthodontic deformity might have occurred if the teeth had been as large as many teeth were, and for that reason Dr. Bogue's view was not altogether contraindicated by the case Mr. Northcroft had quoted.

Mr. Chapman showed models of a case of Class I the treatment of which was started at six years and four months of age.

Treatment occupied eight months. The increased width in the molar region, one year after retention was started, amounted to 7 mm. Retention was maintained for two years and two months, except in the case of a lower central, which was rotated; the tooth was retained for two years longer. Models taken recently, almost ten years after treatment was started, show expansion of 4 mm. in excess of that before the case was started, or a relapse of 3 mm. on the expansion as it existed one year after retention was instituted.

Mr. Cale Matthews said that the Society had had a very instructive and delightful evening. The difficulty of treating cases in the early stages was largely due to the ignorance of the parents. He thought that as general practitioners they must emphasize the necessity of children being sent to them early. Only so would material be obtainable for treatment. The statistics—if one might so term what Mr. Northcroft had put before them that evening—were most interesting. It had always been his own ambition—and he thought it should be one's ideal—to correct his cases by natural position, and the maintenance of position by artificial means was always to be deprecated when it was possible to do without it. Fears regarding long retention were often groundless. If the case was properly corrected, the period of retention need not be so long. He did not quite follow Mr. Northcroft's opening remarks, but he would have thought it so obvious as not to need expressing in a paper before this Society that the necessity of commencing treatment at the earliest age possible should be taught to and known by the profession. Thanks were due to Mr. Northcroft for the fine display of models illustrating the cases at every stage which he had placed in the epidiascope.

Mr. W. Rushton said that the only thing which struck him in Mr. Northcroft's second case was the amount of trouble the child was saved by not being treated at an earlier stage. It was a desirable thing to have left that case until an age when the teeth obviously had to be extracted.

Mr. Maxwell Stephens said that he thought Mr. Chapman was under a little misunderstanding in one respect. Bone developed according to the muscular stresses which made a demand on it. He recalled the fact that the trabeculæ of bone in the case of the femur forming the process in which the muscle was inserted arranged themselves according to the stress. He could not help thinking that if the stress was normally placed in the bones of the face as early as possible in the existence of the child some such formation parallel to that in the femur must be induced. He would like to ask one question of Mr. Northcroft: What happened to the wisdom teeth in those cases which he had placed in normal occlusion early in existence?

Mr. Harold Chapman asked whether he correctly understood Mr. Northcroft to say that in the case in which the molars went lingual to normal in the upper jaw, and which were shown by him in a later model in correct relation with the teeth, they returned to buccal and correct relationship of their own accord without any treatment.

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Mr. Northcroft said that Mr. Chapman was mistaken as to the conclusion of the case; they finished up by being lingual to normal.

Mr. H. C. Highton asked what method Mr. Northcroft had adopted in the case of pre-normal occlusion which he had treated. He had treated a case aged 5 years himself with no relapse occurring. Mr. Northcroft's case was treated at 2 years 11 months (Case 7).

The President said that there was one point with regard to the question of early treatment which perhaps might not be fully understood. It was with regard to the date which Mr. Northcroft suggested. It occurred to him that some of the members, in discussing the early treatment, were considering rather the mechanical treatment and excluding the other. Mr. Northcroft did mention that the treatment so far as adenoids were concerned should be dealt with as early as 5 or 6, and he thought that was a very important part of the treatment.

Mr. S. F. St. J. Steadman said that he thought they must be cautious before drawing too large a conclusion from the case of the rabbit which Mr. Chapman had instanced. He (the speaker) would be the last to say that function was not of the greatest importance in bringing about the growth of jaws, but if one got rid of all the defective teeth in a child, one still got, apparently, jaws of normal sized growth. One would assume from Mr. Chapman's paper that if teeth were taken out early in the child's life there would be less growth of jaw than normal. But that was not so. He had taken out a large number of teeth in children for caries, and got apparently the normal growth.

Mr. George Thomson referred to the difficulty of getting the co-operation of patient and parents. He remembered a lady telling him that her mother died when she was very young, and her father was a very careful disciplinarian. She was in the habit of biting her nails, and every effort was made to get her by discipline to discontinue that habit. One day when she was 15 years of age, a lady visitor commented upon her nice hands, but added, "You will not have nice hands if you bite your nails." It was such a word as that, spoken at the psychological moment, which availed to make her stop the habit. Their advice in the matter of what should be done orthodontically was often disregarded, but much depended upon getting the patient—or in the case of a child his parents—to see for themselves, and then they were assured of all co-operating together. With regard to the noneruption of teeth, he knew of a case where this difficulty was present at 12 years of age, when there was no sign of the premolars in the lower jaw coming through at all. They all knew how erratic teeth very often were as to the period when they erupted. There were thus practical difficulties in the way of fixing any definite age for the treatment of these cases. Mr. Northcroft's suggestion—for which they were much indebted to him—was to fix a period such as 8 years of age, and this seemed really the ideal age if the other conditions were favorable for carrying out the treatment.

Mr. Northcroft, in reply, said that he had to thank the meeting for its very kind reception of his all too feeble effort. The President had referred to the question of Bogue and early treatment. It was his (the speaker's) desire simply to say a word of caution against taking Bogue too literally. He thought one was quite justified in waiting till the age of 8 to see what size the permanent teeth were going to be before one started treatment. There were exceptions to all rules, and there were some very obvious cases of overcrowding and irregularity of the temporary dentition. But when one got the ordinary nonspacing of the teeth at the age of 5 one ought to be cautious about expanding at that age. Mr. Steadman had brought up the question of cases in which all the temporary teeth had been removed and a perfectly regular permanent dentition had resulted. Such cases were in existence without a doubt, and he himself had several cases where either the left or the right side of the lower jaw had been in lingual occlusion, and that side consequently not functioning (although the teeth had been there, they had not been used), and yet the jaw had developed very nearly normally. The anteroposterior diameter of the jaw had not been interfered with at all, and the lateral diameter only slightly.

He had been very much interested in the 6-year-old case that Mr. Chapman had

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shown, for it admirably illustrated his own point that if teeth were found erupting in a jaw in a child aged 5 or 6 that ought to erupt in the jaw of a child aged 7, it did not necessarily mean that there was a lack of bone growth. The jaw was the jaw of a child aged 5 or 6, as the case might be, but the teeth were adult teeth in size and had tried to come up in position in a jaw one or two years too young, and thus there was crowding. He did not think it was necessary to argue that there was a lack of development in the jaw. The bone had not had time to grow sufficiently. Mr. Chapman had brought up another point which seemed absolutely contradicted by the jaw that he himself had shown in Case 144 at 19.3 years. Mr. Chapman said that the growth of bone only occurred where there was need for it. But in his (the speaker's) case that mandible—which was in functional occlusion with the maxilla at the age of 13—had outgrown the upper jaw six years later, at the age of 19, and the cheek teeth in the upper jaw were in lingual occlusion in consequence; the growth of bone had not occurred because there was need for it to grow, but had gone on growing for some other reason.

Then, again, Mr. Chapman had stated that these cases ought to be started upon still earlier than 8. He (the speaker) had simply tried to lay down some broad lines of guidance so that in the schools and elsewhere it might be taught that the average best age of treating cases was 8 years, and that teaching should be modified accordingly. He thought that the desirable age to treat cases was 8 years. Mr. Chapman had suggested that a start could not be made too early if the patients could be got sufficiently interested, and so on, and if it was a practical proposition. But the practical difficulty in the way of starting a case at 6 years old was that one would thereby lengthen the period of retention. By starting at the age of 8 instead of 6, the period of retention was reduced by, roughly two years, in his opinion, and yet a start was made early enough to stimulate bone growth.

Mr. Rushton had suggested that it was a desirable thing to have left his case 303 until an age when the teeth obviously had to be extracted. But Mr. Rushton did not see the models in occlusion on the screen, otherwise he would have seen that the central incisors were projecting over the lower lip, and also the irregularity of the whole arch. No extraction would ever put those incisors in their correct position. The case had to be mechanically corrected; it was too ugly to be left as it was.

In reply to Mr. Maxwell Stephens, he did not know what happened to the third molars in many cases. In his case 144 the third molars were just erupting, and apparently the jaw had gone on growing sufficiently for these teeth to come in their proper position. He had had cases, on the other hand, in which the third molars had been crowded out of the arches, and he had removed them. In fact, he removed a great many third molars—not orthodontic cases at all. The risk of functionless teeth becoming septic was very great.

Mr. Highton wanted to know how the pre-normal case was treated at 2 years and 11 months. He thought it was treated by the aid of mechanical toys mostly! The child used to be given a clockwork mouse very nearly every time she came to see him. At the first visit he was fortunate enough to be able to put screw bands on the $\underline{|d}$'s and insert an upper arch to which he could lace the four incisors, and all he could do at subsequent visits was to screw up the nuts on the arch. Thereby he pushed out the incisors over the arch, and natural retention took place. His idea was that the teeth being in normal occlusion, the jaw was functioning quite naturally, and there was no undue stress. He had always thought that in many Class III cases one could notice the case getting worse and worse simply because of the thrust of the jaw in mastication, and he was sure that if the jaw occluded early enough there was not the same tendency to the protrusion of the lower jaw. He did not think these Class III cases always due to overstimulation from the pituitary, and causes of that kind; some of them might be due to acromegaly and so on, but many were not.

Then, of course, there were means of treatment other than mechanical to be used as the President had suggested. He believed the ideal age for orthodontic mechanical treatment to be 8 years, but he considered it his duty as a dental surgeon to instruct any parents who brought their children to see him in the whole art of looking after their children's mouths. He gave them a talk on the necessity of making the jaws function properly, on seeing

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that the children were fed properly, on the undesirability of giving the children sweets at night or of giving them too soft food. He spoke to them on the necessity of stimulating the growth of the jaws by eating hard foods. He questioned them also about mouth-breathing. All these things were gone into as part of his function as a family practitioner, and it was not this kind of treatment that he was referring to at all when he laid down the age of 8 years. Parents were always asking at what time they should bring their children to him, and his reply was, "As soon as you can persuade them to come," and he added, "It is absolutely essential that your child should come and see me at 3 years of age." Dental surgeons should try to train the parents in their practice to give the children the best chance according to their lights.

REPORT OF CASES SHOWN BY MOVING PICTURE FILM*

BY DR. ADELBERT FERNALD, BOSTON, MASS.

ORTHODONTIA cases by moving pictures is something entirely new with me; I have just begun. My idea is to film a few difficult cases from beginning to end, the oftener the better. Many patients object to having a movie camera show the condition of their teeth. Others wish to have a mask put over their face. That is objectionable because it cuts away a part of the facial expression, which is what I would like to show. The principal object of these motion pictures is to try to show the changes made in the facial expression. There are many advantages in the use of lantern slides. You can focus every case, while with a movie film going at the rate of sixty feet a minute, before you are able to get a good focus of a certain thing it has gone by and something else comes into view. On the other hand, you can get some idea with a moving film about the expression which you could not see so well in a lantern slide.

These photographs were taken in my office under unfavorable conditions. When films are made by experts in their studios, with expert movie stars, only 50 per cent of the films are fit to use, so that when a camera man tries to make a picture of something he knows nothing about, and I know nothing about the movie end of it, we have a hard combination.

I will show you every film I have taken, good and bad, and if any of them interest you I will feel repaid for the time and expense I have put into this work.† As I have said, it is just an experiment. The lantern slides in many respects are much better, and I probably shall go back to them, but not until I have given this method a thorough trial.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.
†Motion pictures were shown illustrating 12 cases.—Editor.

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CASE REPORT*

By J. A. Burrill, D.D.S., Chicago, Ill.

As a part of the symposium on Class II malocclusions I am showing two cases of Class II, Division 1, so identical from the dental viewpoint that it is hardly possible to tell the two cases apart, yet they are very different facial types.

Fig. 1 shows the original condition of the patient at the age of eleven years and two months in August, 1915. This case was treated in the ordinary manner, without any attempt to get root movement, using plain labial ex-

Fig. 1.

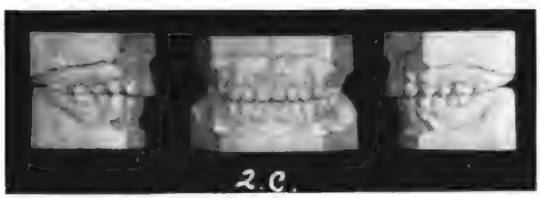

Fig. 2.

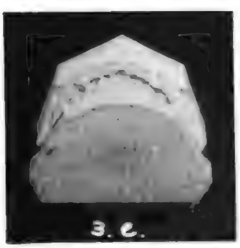

Fig. 3.

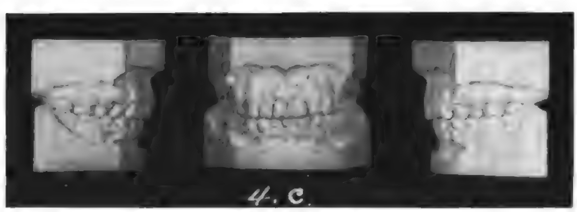

Fig. 4.

pansion wire on the maxillary arch and lingual wire on the mandibular arch with intermaxillary rubbers. Case was retained in June, 1916, with mesiodistal relation corrected and the crowns of the teeth apparently in their normal relations. February 6, 1918, all retaining appliances were removed and the case was watched periodically until November, 1918.

Fig. 2 shows what had developed. The anterio relation had partially

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 26-30, 1921.

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held, but the overbite was too long, with a slight tendency to protrusion and crowding of the maxillary incisors as shown in Fig. 3. Angle Arch pin and tube appliance was adjusted for root movement of canines and incisors.

Fig. 4 shows the result of the root movement as accomplished in November, 1919, when all appliances were removed. Note the prominence of the roots of the maxillary incisors in this slide. Mandibular arch was not treated during second treatment.

Fig. 5.

Fig. 6.

Fig. 5 shows patient's face in the beginning of the treatment and in May, 1920, after all appliances had been off six months.

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Fig. 6 shows the patient's face at the present time.

Fig. 7 shows the occlusal views of the models made in the beginning of first treatment, 1915, and second treatment, 1918, and the final condition, April, 1921.

It is impossible for me to state with any accuracy whether the change in the mesiodistal relation in this case was accomplished by a change in the temporomandibular articulation or an anterior movement of the mandibular

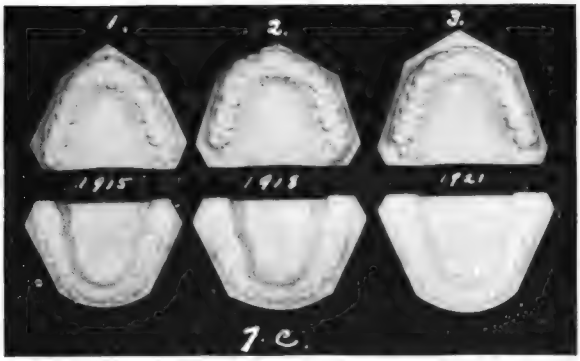

Fig. 7.

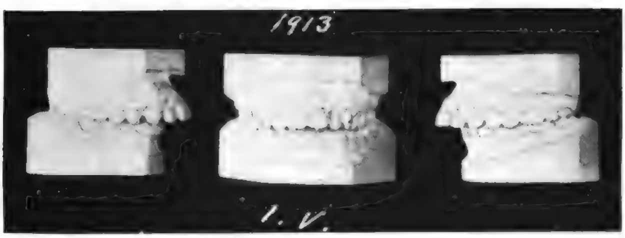

Fig. 8.

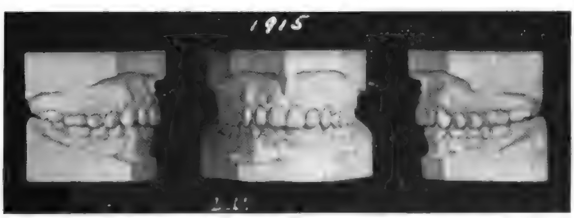

Fig. 9.

teeth and the posterior movement of the maxillary teeth within the jaw. I am inclined to believe, however, that the latter is what happened, as I had no difficulty in maintaining the anteroposterior relation after I had accomplished the root movement of the maxillary canines and incisors.

Case II.—Fig. 8 shows models of a case, age thirteen years and nine months, in October, 1913, so near like the previous one that you are almost unable to distinguish them. This case was treated with anchor bands on first molars and bands with Angle tubes on canines, (maxillary and mandibular); .030 arches

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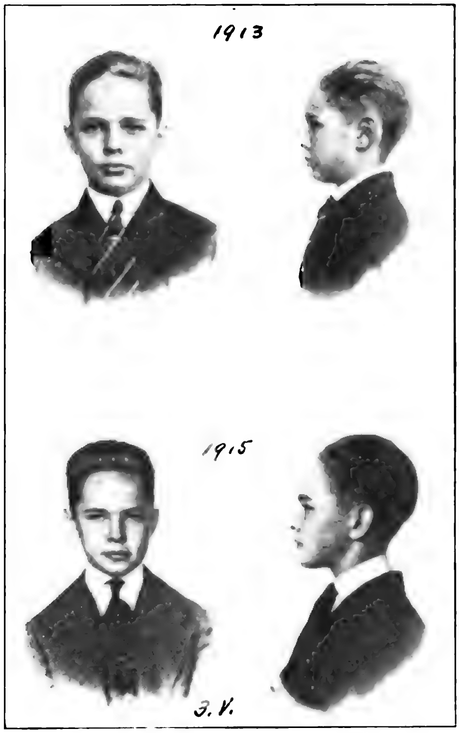

Fig. 10.

Fig. 11.

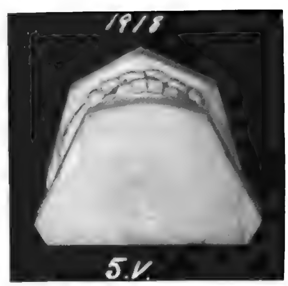

Fig 12.

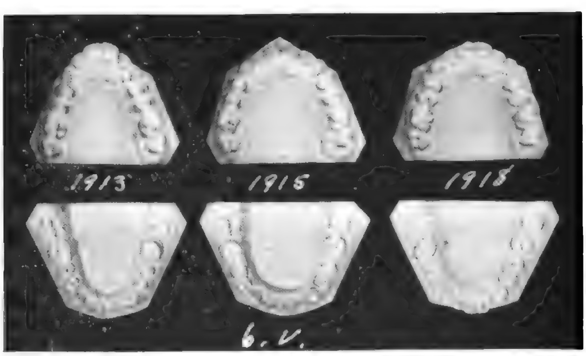

Fig. 13.

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were used with Angle pins fitting the tube on each canine band, thus attaining root movement in the canines only. Intermaxillary elastics were used. Retainers were worn for one year and three months and all appliances removed in September, 1915, with the result as shown in Fig. 9.

Fig. 10 shows the patient's face at the beginning and in September, 1915. The case at this time seemed to be almost perfect, but on examination in June, 1918, showed the result as in Fig. 11. Note that the anteroposterior relation has held on the right side, but slipped on the left. Note also the lack of fullness in the incisor root region similar to the former case before root movement was accomplished.

Fig. 12 is an attempt to show the incisal occlusion at this time. When this case presented in this condition I was under the impression that the cause of the shifting of the anteroposterior relation on the left side was that the patient did his chewing entirely on the right side.

Fig. 13 shows the occlusal views of the teeth at the aforementioned dates. Here again I am unable to state where the anteroposterior change has taken place, and I am sorry not to be able to show this case at the present time. My plans to obtain later models and photos were frustrated by the patient not showing up when requested, but the case has remained almost identical with the condition in the picture of 1915 and the model of 1918. This case while not an entire failure has been improved wonderfully in the facial contour and I believe had I the opportunity to get the root movement as accomplished in the former that I could maintain the anteroposterior relation on the left side also, as I believe that the tendency to return to Class II subdivision, was brought about by the improper relation of the incisor teeth.

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A SOLDERING STAND*

By Ernest N. Bach, A.B., D.D.S., Toledo, Ohio

THE soldering stand illustrated here was originally intended for orthodontists, although by the addition of a charcoal block or asbestos cup, it makes a convenient soldering stand for the general practice.

When making appliances by the indirect method, various difficulties are encountered, such as the instability of the model when adapting the lingual wire, or soldering on the buccal tubes, etc., as well as the breaking off of the banded teeth. This little device is designed to overcome these obstacles as much as possible, and yet itself being very simple. The soldering stand as originally given at the clinic consisted of a heavy cast iron base, (Fig 1, *a*) about 4½″ in diameter, and ¾″ thick. Into this was loosely seated the base of a ball joint, and prevented from rotating by a set screw (*D*). The table (*C*), upon which

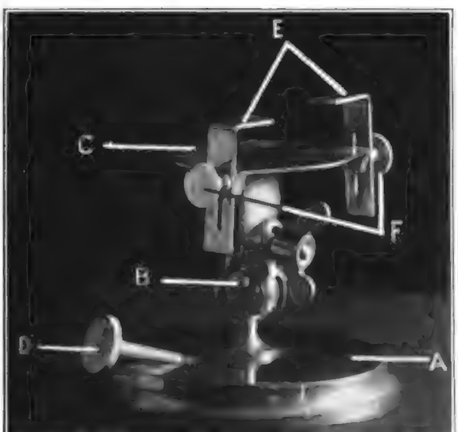

Fig. 1.—The original soldering stand.

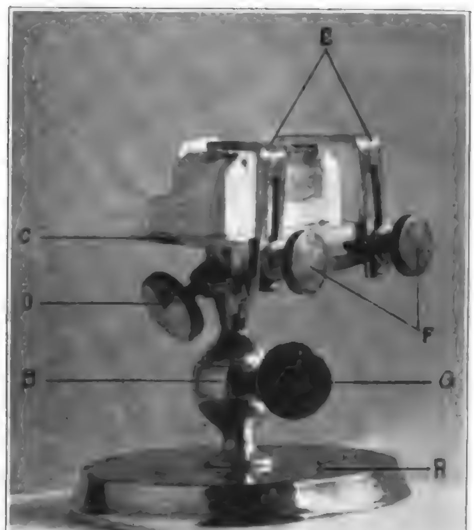

Fig. 2.—The new soldering stand. Parts cast of bronze with exception of base.

the model is placed and held, is rigidly attached to the upper half of the ball joint. The model is held there by the two adjustable clamps (*E*) which clamp the model from the sides and in turn are held or secured by the screws (*F*). The clamps are placed tightly on the molars, thus preventing them from breaking off when soldering appliances to the bands. They also hold the model to the table.

This device gives a freedom of movement in any direction. The table can

*Clinic given before the American Society of Orthodontists, and the Dewey Alumni Society, Atlantic City, N. J., April 26-30, 1921.

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be tilted to any angle up to 45°, and held there by tightening the thumb screw (*G*) on the ball joint, but cannot be rotated easily.

During the clinic, suggestive changes were received and used in making the new stand with the result shown in Fig. 2.

THE NEW SOLDERING STAND

The same size and kind of base is used as in Fig. 1. The table is pivoted above the ball joint which allows the model, when clamped to the table, to be rotated while set at any angle without moving the whole base. The set screws to prevent rotation of the table, are placed directly below the same (Fig. 2, *d*). The clamps (Fig. 2, *e*) are heavier and narrower than those of Fig. 1, *e*, and placed at the back instead of the side of the table as shown in Fig. 1, but slotted the same in both cases. There is an additional slotting of the back of the table which allows the clamps to be moved horizontally as well as vertically. This provides for various widths between molars as well as various thicknesses of models, when adjusting the clamps.

The narrow clamps expose both buccal and lingual surfaces of the bands for soldering, and are held securely by the thumb screws(*F*). The ball joint allows a 90° swing and can be tightened by the thumb screw (*G*), although this is usually set fairly snug and seldom touched. The whole apparatus is heavy enough to stand quite a side push without moving, and the base is covered with felt, which allows the stand to be used on a porcelain or glass top cabinet without scratching.

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APPLIANCES*

By J. E. Taylor, D.D.S., Hollywood, Calif.

In presenting to you the subject of appliances it first becomes necessary to touch at least superficially upon the physiologic and biological problems with which we have to deal, that the problems confronting us are primarily developmental and secondarily a tooth problem is evident to anyone who observes and follows the trend of modern thought on this subject. An intelligent discussion of the faults and virtues of the appliances of today or of the future is impossible unless we take into consideration all the broader aspects of the phenomena with which we have to deal. Until recently the mechanical procedure almost exclusively dominated the practice of orthodontia. The science became a system of mechanics for restoration of normal form with practically no consideration of the forces governing growth and development. Diligent inquiry into the etiology of malocclusion compels the recognition of the fundamental facts of biology and physiology. Considerations other than mechanical are becoming more and more predominant in the mind of the trained specialist of today. Form and function go hand in hand, fundamentally related. In the correction of malocclusion, our aim is the restoration to the normal form. It is then not inconsistent to demand that we accompany the process with normal function. All form is dependent upon and a result of function. Theoretically then, it is impossible to have perfect form without perfect function, and by function the writer means not only function of the teeth themselves and the muscles surrounding the parts, but the function of metabolism, and nutrition, including all the physiologic processes of life. Normal metabolism means health, growth and development, any disturbance of the metabolism reverses the process and our beautiful physiologic process becomes pathologic. Malocclusion in most cases means abnormal development of a part or parts and a resultant inharmonious whole. We must then undertake the restoration by a process of stimulation of cellular activity, always mindful of the physiologic facts governing growth. In this connection it is well to think of the teeth themselves as a part of your appliance, the teeth being simply a means to an end, a convenient attachment for a force which will stimulate growth. While great progress has been made no genius has as yet given us the ideal appliance, my conception of the ideal would be a very delicate apparatus which neither pushes nor pulls the teeth to normal position but one that *grows* them there. The writer has seen a badly impacted maxillary canine lying in a torsilingual position brought into normal position by an intelligent physiologic development of the surrounding parts. We must eliminate excessive mechanical stress and closely

*Read before the Alumni Society of the International School of Orthodontia, Kansas City, Mo., July 14, 1921.

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follow the accepted doctrine that "The teeth shall not be moved more rapidly than the resorption of tissue on one side is compensated for by the construction of new tissue on its opposite side." I do not wish to be too critical but in the light of only a superficial knowledge of the forces governing growth, it seems to me that even the most modern appliances embody too much rigidity and too many bands. Every living thing is pliable and resilient, rigidity has no place in the scheme of growth. You will get a better conception of what I mean if you will get a mental picture of a ten-year-old boy attempting to functionate in a straight-jacket.

The ribbon arch as given to us by Angle was a great step forward and marked an epoch in the construction of appliances. The curvilinear sheath attached to the band is absolutely correct in principle. The lingual arch with its accessory springs as given to us by Mershon and Robinson was another marked advance. The writer believes in the efficiency of the Robinson and Mershon appliances, their cleanliness, lack of bands, ligatures, etc.; but he sees no necessity for the half-round tube and lug attachment to the molar. The enforced rigidity of this and similar attachments must seriously interfere with the nutrition and metabolism of the tissues surrounding the tooth. It is also apparent that any outward lateral movement of the molar when attached rigidly to the end of the lingual arch wire would cause the distal to move more buccally than the mesial, thereby throwing the distal cusps out of normal line. There should be a flexible arrangement of the attachment which permits rotation of the anchorage and not the tooth, something lingually to embody the principle of the curved tube of the Angle appliance. In this connection I offer for your consideration and criticism a lingual arch attachment using a round tube and lug instead of the half-round.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

SPEEDY TECHNIC OF ROENTGENOGRAPHING THE TEETH

By C. A. Le Master, D.D.S., St. Louis, Mo.
Professor of Roentgenology at the St. Louis University Dental Department

THERE are many conditions that confront the dental roentgenologist in which it is necessary to make roentgenograms of individuals who cannot hold still during the exposure, and the roentgenologist has been unable to obtain roentgenograms of diagnostic value for such patients. The following cases are in the above class: Children and patients of advanced age; those suffering from nervousness; patients who gag easily; those who cannot refrain from swallowing; those suffering from diseases which cause involuntary

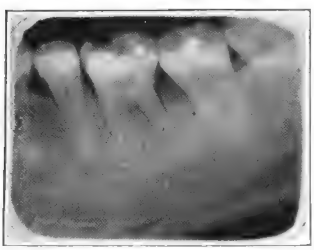
Fig. 1.

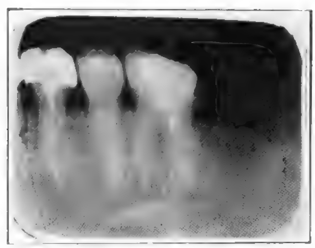
Fig. 2.

Fig. 1.—Mandibular molars; young boy seventeen years of age could not refrain from swallowing during the exposure. Exposure was made with one-fifteenth of a second time. Please note that the process surrounding the apex of distal root is diffused and the interradial area is also involved.

Fig. 2.—Maxillary first molar. Patient gagged and could not hold the film quietly in place in the mouth. Exposure was one-fifteenth of a second. Please note granulomas on all three roots with absorption of the apices.

motion of the head, hands, and body; finally, those who, from injury or sickness, have not sufficient strength to hold the dental film quietly in place. These are only some of the conditions encountered, and it is more important to obtain good diagnostic roentgenograms of the teeth of such individuals than of the average patient, as the condition of their teeth often plays an important part in the cause of their disease or of the patient's recovery.

To obtain roentgenograms without the blurring caused by motion is not possible with the regular technic for roentgenographing the teeth, as the ex-

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posure is too long and the slightest motion of either the patient or the film will make the roentgenogram worthless; therefore it was necessary to obtain a method whereby the time of the exposure could be shortened. I have tried many methods to shorten the exposure, in one I used the duplitized film with two intensifying screens within the mouth; this was done by cutting down a duplitized film to the size of the Eastman dental film No. 2 using two small pieces of intensifying screens the same size and a casette to accommodate these, made of two thin pieces of aluminum hinged at one end; placing the film and screens within the casette and instructing the patient to bite upon it, the biting force causing the screens within the casette to come in close apposition to the film. With this method I succeeded in shortening the time of exposure considerably, using 30 ma. (Milliamperage) with a penetration of 5 inches; however, the time of exposure was not short enough and the detail of the finished roentgenogram was not good due to the graininess caused by the screens. To obtain ideal results practically an instantaneous exposure must be made approximately from one-tenth to one-fifteenth a second exposure. This will eliminate blurring by motion. This I succeeded in doing

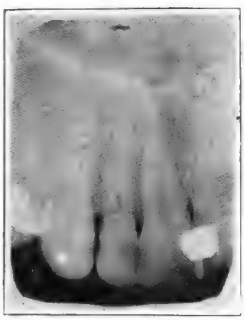

Fig. 3.

Fig. 4.

Fig. 3.—Maxillary, central and lateral incisors; patient extremely nervous and would not remain quiet. Exposure was made with one-fifteenth of a second time. The process surrounding the apex of the lateral incisor shows evidence of involvement.

Fig. 4.—Maxillary central incisor, patient was very nervous and would always turn head about time the exposure was to be made. It can be noted that the cone has cut off the edge of the roentgenogram but even with the patient in motion a diagnostic roentgenogram was obtained.

through the following experiment: I used a wet specimen as a subject; the speed type dental film; a 30 ma. Coolidge tube, standardizing on a four-inch penetration. Due to the fact that I intended to use a higher milliamperage than 30 it was necessary to use a very short exposure to safeguard the target of the tube, so I used one-tenth of a second exposure. The first exposure was as follows: 18-inch distance; 40 ma.; four-inch penetration with a result that I scarcely obtained an outline of the teeth on the film. I gradually increased the milliamperage to 50 ma., always keeping the penetration at 4 inches, when I obtained a fairly clear outline of the teeth on the film. I continued to increase the milliamperage until I obtained a roentgenogram clear in detail. The last exposure, which was ideal, was taken with the following technic: Distance 18 inches; film used, the speed dental film; penetration, 4 inch; milliamperage from 70 to 80 ma. I could not get the exact reading

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of the milliamperage used as the exposure was too short, but I checked it up with a broad focus Coolidge tube with a longer exposure and the reading was 70 ma. This was not an accurate test as the tubes differ slightly and there might be a slight variation of the current, nevertheless it was close. I then marked the position of the Coolidge rheostat and auto-transformer so that I am always able to obtain approximately the same exposure each time.

A roentgenogram of the teeth taken with this technic will give ideal results with the patient in motion.

Fig. 5.—Extraoral roentgenogram of the mandible. This was taken with one-fifteenth of a second exposure, using duplitized film and double screens. It is often necessary to make the extraoral roentgenograms and this one is shown simply to illustrate the results with the speedy technic.

The question always asked is "How long will a tube of the 30 ma. type hold up under such use?" The target of my tube is not marred a bit and I have taken several hundred such roentgenograms in the past few months of patients needing this technic. I have speeded up the time of exposure, however, and am now using one-fifteenth of a second. I do not think that an exposure so short will injure a tube; and even though a tube would only hold up for a few hundred exposures, it would be well worth while for the service rendered the patient in roentgenograms of diagnostic value.

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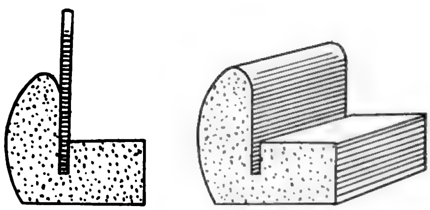
DENTAL FILM HOLDER*

By F. B. Sheldon, Fresno, Cal.

IN presenting this appliance I wish to state that it is not original with me, but I have been using it for the last year and find that I get very good results with it. Also it is easier for the patient than the old finger-holding method. Dr. J. DeVoine Guyot, in presenting his method in the August number of the *Journal of Radiology,* states that he is still using the old finger method for holding the film in the lower jaw. This appliance is equally good in either the upper or lower jaw.

The appliance consists of a small right-angle block of wood 2 c.c. wide and 2 c.c. high and 1½ c.c. long. The shape of the block is shown in the illustrations. There is a slot, for the insertion of the side of the film, cut in



1. 2.

Fig. 1.—End view showing the film in place.
Fig. 2.—To show the slot across one side.

one side. The size of this slot will depend on whether the Buck or the Eastman film is used. The upper angle of the block which comes behind the film is made rounded so that the film in the roof of the mouth will not make a sharp angle but will better conform to the palate.

In using this holder the film is placed in the slot with the back to the vertical portion. The film is then placed in the patient's mouth, as usual, and the patient told to close his teeth on the horizontal part. This holds the film in position better than any other method that I have tried.

These blocks may be made up in a long strip and then cut to the desired length and in this way the cost need be but very little.

*Reprinted from the Journal of Radiology, November, 1921.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

A Non-Surgical Removal

Q.—From these films, can you tell me whether the supernumerary tooth lies on the labial or lingual of the other teeth? I want to remove the tooth, but cannot locate it by digital examination. If the radiographs are not sufficient, tell me how to make others which will give me the necessary information for the operation.

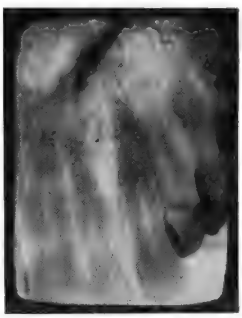

Fig. 1.

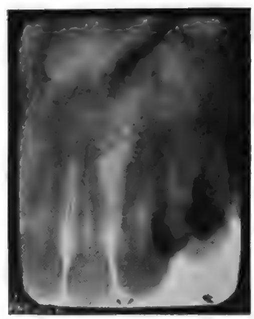

Fig. 2.

A.—If a film is placed to extend from the lateral incisor to the first molar, and the central rays are directed parallel to the mesial surface of the first premolar, the imaginary supernumerary will be removed. The mistake was the result of directing the rays at such an angle to the teeth and film, that the image of the first premolar was distorted, and the lingual cusp superimposed on the canine.

The two films show too nearly the same aspect to eliminate the factor of error, and the following suggestions may help you to avoid similar mistakes. Sometimes, it may be desirable to verify findings from the same aspect, but usually more information is obtained from a different viewpoint. Therefore, if the second exposure was made before seeing the results of the first, there should have been a marked difference in the relative position of the tube to get the most value from the two exposures. If from the first exposure an abnormality was suspected in the region of the canine or first premolar, the logical course would have been to get a direct view of this region, instead of again "aiming" at the lateral incisor.

Although careful technic minimizes the distortion of images, it cannot be entirely prevented when films of standard size are used for the anterior teeth, because of the curve in the dental arch. Superimposed teeth, and any

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part of a negative which is indistinct from bending of the film or other causes, should be ignored as evidence. The radiographic examination of all areas should be sufficiently thorough to exclude the possibility of misinterpretation through technical errors.

A Three-Inch Capacity Unsatisfactory

Q.—Please give me some advice in the purchase of an x-ray machine for use in my dental practice. Do you recommend a 3-inch, or a 5-inch spark gap? The 3-inch machine seems easier to manipulate, but I also want one which is entirely safe for the patient.

A.—Knowing that you want radiographic equipment for efficient service, not merely to impress your patients, I should unquestionably recommend a machine with a 5-inch spark gap. Transformers with a capacity limited to a 3-inch spark do not give sufficient voltage to produce the best results. To use them, either the tube is placed too near the patient, the exposure is excessively prolonged, "extra fast" films are used, or a combination of these expedients is employed.

Placing the tube too near patients increases the danger of dermatitis by exposing them to more "soft" radiation per milliampere second, and distorts the image recorded on the negative. Prolonged exposures increase the skin dose, and when this is necessitated by a lack of penetration due to low voltage, the risk is proportionately greater. The highly sensitive emulsion on the "extra fast" films is granular to a degree that it impairs the definition of the negative, and has a restricted exposure latitude. Exposure latitude is the limit of underexposure and overexposure which will produce a usable negative.

A "back up," or spark gap of 4 inches to 4½ inches, is generally considered correct for intraoral films. There have been some advocates of a "soft tube" technic, who claimed exceptional results with a 2½- to 3-inch "back up." Doubtless, this vogue had its origin in the attraction of strong contrast in negatives, but contrast should not be attempted at the expense of detail. For diagnostic purposes, radiodontic negatives should clearly disclose the cancelli of the bone, and the roots and canals of the teeth.

No apparatus, which generates x-rays, is "entirely safe" for the patient. There is less danger of serious electric shock from 3-inch machines, but more danger from x-ray burns. The estimated voltage required to jump 3 inches of atmosphere is 40,000 volts, while 5 inches requires 60,000 volts. The injurious effect on the skin is proportionately greater, to produce negatives of similar density with a 3-inch spark gap, than with a higher voltage. Advertisements claiming safety for x-ray equipment are misleading, and for the protection of the innocent or ignorant, should be suppressed. The only basis for the claim is some manner of guarding the high tension current from the patient. The only protection against the danger of x-ray exposure is the careful application based upon a knowledge of the factors in dosage and an intelligent respect for it.

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The Trials of the Younger Brother

Q.—I am the only dentist in town using radiography, and it is showing many bad results from the operations of the two other dentists, who have practiced here for almost twenty years. They have not been very friendly to me, and try to make a joke of my x-ray machine. I do not want to make matters worse by criticizing their work, but what can I do about it?

A.—Your position is unpleasant but courage and diplomacy will help you more than sympathy. It is only human for the older men to view your intrusion in their "sacred" field with ill-concealed antagonism. It is a peril which has haunted them in nightmares, but was never expected to appear in reality—with an x-ray machine. When this is fed by "small town" prejudice and gossip, only a philosopher, or a fool, could accept it amiably. You are much more of a blessing than a curse, for you will force them to do what they should have done without you—modernize.

Regarding the special problem of your attitude toward former patients of other dentists, your duty is clear. The obligation of a dentist or physician to his patients takes precedence over all others. When you find conditions, which for the welfare of the patient, should be corrected, let nothing deter you from the proper recommendations. Do not stifle your conscience and dishonor your profession to ingratiate yourself.

However, there is a marked difference between professional advice and unprofessional criticism, and there is no better test of ethical motives than the manner of discussing the operations of other men. Written codes can only restrict gross infractions, ethical principles are inherent and require no regulations. Often it is unnecessary to describe existing conditions, in advising the proper procedure. If conditions are evident, or the patient insists upon knowing them, you should not collaborate in an attempt to indict a former operator. Remember that x-ray examinations were not generally utilized until recent years, and all kinds of malpractice has been advocated at times, even some theories exploited at present are decidedly questionable. Extend a little more charity than you desire from your fellow-men.

Ignorance, misfortune, and incompetency should always be condoned. When you encounter unmistakable evidence of dishonesty, lies, and criminal negligence, if you still desire to protect the culprit at any cost, you should apply for advice to some one who is more of a Christian than the writer. A dentist, who mistreats a patient to obtain a fee, lies to avoid admitting his mistakes, and deliberately exposes patients to disease, is imposing too much upon professional courtesy and deserves to be condemned.

Your x-ray machine will prove to be a *joker*, instead of a *joke*, and soon cause your competitors more chagrin than amusement. Ridicule is a weak argument, and usually resorted to from the lack of any other. In this case, do not be influenced by it, because you are pursuing the right course to give your patients modern service and to win the confidence and patronage of the community.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Care of the Teeth. Public Health Reports, November 18, 1921.

While the article is elementary in content, it contains matter of general interest. The splendid teeth and "reinforced" alveoli of the Esquimaux appear to be due entirely to the use he makes of them not only for eating but as a handy tool for routine work. While the baby at birth is commonly spoken of as toothless, his gums contain not only preexistent milk teeth, but the germs of the permanent teeth. The six year molar is the most important tooth in the head and the most neglected. One may learn much about the proper use of the toothbrush by smearing the nails with clay or vaseline, and then removing this artificial coating with the brush. The keynote of cleansing the teeth, aside from keeping away germ life, is that every accessible surface should be polished.

Under pyorrhea it is stated that accumulation of tartar where teeth and gums join is a contributing cause but cannot produce the condition alone. Other substances can produce irritation and infection of the gums. There is no specific and the only treatment is to remove all of the foreign matter and then polish the exposed portions of the teeth. All depends on systematic cooperation of dentist and patient with quarterly consultations.

Under focal infection the x-ray plate must be the criterion and it will reveal the occurrence of pus collections and pockets filled with putrid detritus which are a menace to health. It does not follow that these are the sole cause of rheumatism or even perhaps the only factor in a given case, but they are certainly a common factor both in certain diseases and in the ill health of the individual.

Preventive Dentistry from a Slightly Different Point of View. H. E. Friesel, Pittsburg. The Dental Summary, November, 1921, xli, 11.

The author discusses the prevention of dental focal infection. In proceeding chronologically, the grinding surfaces are naturally immune to caries unless there are defects in the enamel—pits and fissures—through which microorganisms can penetrate. The cavities here form beneath the enamel and the orifice is smaller than the cavity. These are the lesions which first demand

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attention. But little excavation is necessary and after proper filling with amalgam or cement there is not much liklihood of recurrence. Next for consideration is the spreading caries of the septal surfaces which is a slow process. Third is the form which attacks the buccal and labial surfaces of the teeth, which is also a form of spreading decay of slow evolution. A fourth form known as senile decay is seen principally in the elderly. These varieties of caries may constitute as many different stages in some subjects. In regard to preventive dentistry in the interest of lessening focal infection and disease secondary thereto, there is usually time to treat pit and fissure cavities and prevent the later developing forms. In addition to proper treatment of caries tooth restoration is an important factor in preventive dentistry, the form and contours of the restored teeth being made to harmonize with those of the gums. Since the introduction of the theory and practice of focal disinfection, the work of the dentist has greatly augmented and its prestige and status have correspondingly improved. Since the dentist has therefore approximated the full status of a surgical specialist it behooves him to consider the preventive end of his specialty; for he no longer seeks to prevent decay in the mere interest of the teeth and digestion but in the prophylaxis of a vast amount of preventable disease.

Bacterial Invasion of Dental Tissues. H. W. C. Bodecker, Berlin. The Journal of the National Dental Association, November, 1921, viii, 11.

The author in his summary of the above article states that it is impossible for the mouth acid formed by fermentation of food to acquire the necessary concentration for decalcification of the teeth already carious let alone sound teeth. To account for caries due to acidity the acid must be formed *in situ* by microorganisms. For the latter to grow a mixed nutrient medium is necessary—one containing both carbohydrates and protein. The former are formed from the food by salivary digestion. The microorganisms of the mouth have no proper motion and advance by ordinary proliferation; and the richer the medium the more rapid the advance. The organisms do not invade the teeth at haphazard but along definite lines, the tissues attacked being the non-calcified organic matter which is rich in albumin. Caries is in all probability a local infectious process. Despite its typical forms no two cases of carious teeth are exactly similar, or at least it would be mathematically possible to have from three to four million combinations.

Removal of Tonsils and Teeth for the Cure of Rheumatism. Editorial, Journal of the Indiana State Medical Association, November 15, 1921, xvi, 11.

Statistics of the Metropolitan Life Insurance Company show that there has been a marked decline in the mortality of rheumatism during the past ten years. This is explained by clinicians as the natural outcome of the present custom of extirpating foci of infection in the teeth and tonsils. The editor does not antagonize this explanation, although he insists that in the absence of an exact diagnosis there is much wasted effort in connection with the ablation of tonsils and extraction of teeth which have never been a menace

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to health and life. A chance is given for untrained and perhaps also for unscrupulous practitioners to do something final for the relief of their patients (the editor does not question the good faith of these men although it is evident that the fee for a tonsillectomy may furnish a subconscious if not a conscious motive for intervention). The dentist who pulls sound teeth in the hope of removing a focus of infection most frequently acts to please the medical man who sends the patient to him; it would of course be awkward to refuse when the physician insisted and when in addition the radiogram backs up the indication. In regard to the tonsils, if these are large they may be free from infection while conversely relatively small ones may be infected. The tendency of the day is to make both dental extraction and tonsillar extirpation regular surgical procedures performed under anesthesia and finished by suture; the editor does not comment on this fact but naturally such an attitude makes a correct diagnosis doubly important. The "surgical extraction" of a sound tooth seems unthinkable.

Etiological Relation of Focal Infections to Remote Diseases. T. B. Hartzell, Minneapolis. The Journal of the National Dental Association, September, 1921, viii, 9.

The author illustrates the possibility of wrong diagnosis, citing the case of a woman thought to suffer from muscular and articular rheumatism by her physician, who sent her to him. He found some pulpless teeth but the disease picture was not entirely clear and a blood count showed 38 per cent of eosinophiles which led to a research for parasites. Another case was found in the family of the same blood state. The stools being negative as far as intestinal flora were concerned the history of rare pork consumption made the diagnosis of trichinosis. The constitutional infection may have been a mixture of the latter with streptococcic infection. Upon removing the pathological teeth the patient recovered but was not free from symptoms for six months, suggesting that the pork worm was largely responsible for the illness. In another case of presumable streptococcic infection from pyorrhea the blood count and follow up of the case showed the presence of pernicious anemia. Death occurred in less than 4 weeks from consultation. In another patient from whom infected teeth had been removed developed an exacerbation of tuberculosis apparently lighted up by the operation or narcosis. In still another patient what was at first regarded as simple rheumatism from dental infection proved to be gonorrheal rheumatism and the extraction of the teeth is of course without benefit in such cases. Dr. Hartzell cites a number of other interesting cases of mistaken diagnosis of dental infection.

Focal Infection with Especial Reference to the Tonsil. J. H. Hester, Louisville. American Journal of Surgery, November, 1921, xxxv, 11.

In the research for foci of infection the general practitioner is poorly qualified; for if he begins to look for such a focus he must investigate the entire body of his patient. Experience shows that in removing tonsils and teeth other foci are often left behind; so that while some improvement may

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follow these partial removals the patient cannot make a complete recovery. Hence under ideal conditions subjects with suspicion of foci should consult a group of diagnosticians such as may be found in the largest cities. The expense of the trip, however, is often prohibitive. The practitioner in the smaller locality must therefore obtain such cooperation as he can from the nose and throat specialist, laboratory man, x-ray diagnostician, dentist, internist, neurologist, etc., of his own neighborhood. The laboratory man may furnish information concerning the nature and virulence of the microorganism at fault, and the author lays much stress on this point. The nose and throat specialist is in position to make a clinical diagnosis of the character and degree of tonsillar infection, and if these organs are infected they should come out without waiting for a special indication; for not only do they menace the otherwise sound man but they are a handicap to the invalid. The author relates a case of recovery of health following tonsillectomy in a case in which the diagnosis had been acute miliary tuberculosis; and apparently subjects with diagnosis of tuberculosis of the ordinary species may benefit strikingly from the same intervention. The type of case mentioned appears to be what the French term pseudotuberculosis from disease of the upper air and food passages; many having been rejected as soldiers in the late war under the impression that they were actively tuberculous.

Technic of Reimplantation. M. Ludwig (Bautzen). Zahnaerztliche Rundschau, August 9, 1921, xxx, 32.

The author believes that this ancient art is being rehabilitated as a regular resource in conservative dentistry after a period in which its use was restricted to accidental emergencies. The technic is so nearly perfect that insuccess is rare. The possibility of reimplantation under all possible conditions should not be lost sight of. In addition to loss of a tooth from a fall or blow, the author recommends it in a marked periostitis of the molar teeth. If the loss of a tooth is the dentist's fault the tooth will of course be reimplanted immediately. Mamlock also recommends the act in pyorrhea alveolaris, but the author has had no experience here, and does not understand why wiring, etc., would not answer equally well. Nor does periostitis in premolars and front teeth appear to indicate implantation. The strictest asepsis is indicated despite the fact that implantation of dirty teeth after accidents has often succeeded perfectly. Conduction anesthesia is indicated with every possible effort not to injure the alveolus, in all cases where a tooth is to be extracted for subsequent implantation. Not to produce alteration of the alveolus is very difficult in certain cases where the shape of the molar, is unusual, as in widely spread roots. Much personal experience is a great advantage, but as a rule the tooth after preparation will glide back into its socket without trouble, there being a slight rotation. The author places the extracted tooth in normal saline infusion at 37° C. and packs the socket with iodoform gauze. The extracted tooth is now taken out of the solution, its crown wrapped in sterile mull and its roots treated, especially in periostitic cases when treatment should be very thorough including sealing the apex with gold amalgam. The tooth

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is then replaced in its socket, and ligatured. The author last year reimplanted five teeth with great success, two having been the origin of a palatal fistula.

Cleft Palate and Harelip. W. H. G. Logan. Journal of the National Dental Association, November, 1921, viii, 11.

The author teaches that a child born with cleft of the hard palate and lip should be operated on as soon as it regains its birthweight and is making satisfactory physical progress from day to day. A pediatrist should attend to preoperative and postoperative care. In total cases the defect in the alveolar ridge and anterior third of the hard palate should be closed first (save when the defect is so great that closure would distort the nasal fossa of that side). The hair lip may be closed in from 4 to 8 weeks after the bone operation. If protruding premaxillary bones are present, they should never be excised but adapted to form an intrinsic part of the jaw—they contain the germs of the permanent incisors as well as those of the deciduous teeth. When the separate bones are in apposition the dense (?) surface should be removed. There should not be too much tension on the lead plates. In reforming a broadly spread nostril or lip there must be free undercutting in order to secure apposition without tension. In regard to technics the author recommends equisitene for the lip in place of horsehair and seals the line of incision on the labial aspect with liquid benzoin evaporated to a syrupy consistence. To the cheek and face should be applied the traction bow and tension straps of adhesive plaster or Canton flannel with celluloid and acetone solution.

Bone Phlegmon of Dental Origin. Jacques (Nancy) Revue de laryngologie, etc. Oct. 15, 1921, xlii, 19.

According to French exchanges a recent article by Sebileau has done much to clear up the obscurity of this subject. These lesions are known as perimandibular phlegmons, internal odontopathic phlegmons of the mandible, odontogenic osteoperiostitis of the same, etc. The latter is the proper term because pus does not always form. There may be a simple inflammation with resolution, or after some days pus may form and escape, invariably leaving a fistula. Jacques can add something to this picture—a less acute type which forms a pseudocyst. Clinically there is no resemblance to the ordinary acute forms, although there may be transitional conditions in which crises of suppuration occur. A number of case histories are given and the lesion is summed up as a flattened tumor, smooth and covered with normal mucosa applied closely to the bone and apparently continuous with it. While the acute forms are often spoken of as peculiar to the mandible, the present type, according to the author's material, is found on the superior maxillary, and on both aspects. Its progress is slow and insidious and it may be stationary for long periods. Fluctuation is simulated, but the introduction of the exploring needle brings nothing away. The lesion, however, is motivated by an apical infection of a very attenuated character. The diagnosis of these cases is difficult

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because tuberculosis and syphilis can cause a similar manifestation, and so might fibroma of the periosteum, chondroma, osteoma, malignant disease and especially paradental cyst, the latter simulating the lesion very closely. Extraction of the offending tooth may make the diagnosis, because the lesion at once disappears after this act.

Some of the Present Problems of Operative Dentistry. C. N. Johnson, (Chicago). The Dental Cosmos, October, 1921, lxiii, 10.

The author first discusses prevention of caries. We are making progress here, although perhaps we can only visualize it by comparing the teeth of children with those of their parents, and by comparing the teeth of people who patronize the dentist habitually and those who do not. We know that early filling not only tends to preserve the filled teeth but it retards decay in the teeth still intact. Periodical scaling by the dentist and daily cleansing by the patient complete our resources for prevention of caries. In regard to prevention of pyorrhea there are scaling and the removal of spaces in which food can habitually lodge, as well as improving the occlusion of certain teeth. The third subject mentioned by the author is extraction vs. conservatism. The craze for promiscuous extraction is due largely to forced interpretation of certain x-ray shadows in the absence of any clinical evidence of apical abscess. It is best to tell all patients that this resource unaided should not doom to extraction an apparently intact tooth. It is not alone what appears on the plate but the tactless wording of the röntgenographers' reports which is responsible for much unnecessary extraction; because the language of the report, which the patient is usually allowed to see, often preys on his imagination, and makes him willing to sacrifice a tooth which the dentist himself might be willing to retain. The so-called surgical extraction of teeth with its curettage and suturing is somewhat of a meddlesome practice leaving the patient with a very sore mouth and lightened pocket book—for as a definite surgical operation the charge of $25 is not excessive—and the strictly ethical dentists should discountenance the practice before it becomes widespread.

Danger Signals in Nitrous Oxide-Oxygen Anesthesia. E. R. Bier (Winnipeg). Oral Health, October 31, 1921, xi, 10.

In a city like Winnipeg less than half a dozen men are empowered to administer this anesthetic association, which is alike the safest and most dangerous according to conditions. Supposing that the anesthesia is going ahead under all the favorable conditions, the first danger signal may be in the quality of the respiration which may be very slight and superficial, hardly perceptible. Should this be the result of overdosage cyanosis will appear; whereupon the inhaler should at once be removed and oxygen given. If the breathing signifies that the anesthesia is wearing off the subject should show a deep pinkish hue and requires that the oxygen be shut off and more nitrous oxide given. If the subject is pale and sweating he requires oxygen with removal of the inhaler. Other danger signals have to do with blocking of the air passages, which may occur in theory under a variety of conditions, most of

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which can be prevented. Should this accident occur the resulting paralysis of respiration must be antagonized in a variety of ways if necessary, including traction on the tongue, inversion, artificial respiration and perhaps tracheotomy.

The Ultraviolet Ray in Dentistry. Lt. Louis B. Lippman, U. S. N., Brooklyn. American Journal of Electrotherapeutics and Radiology, October, 1921, xxxix, 10.

The author who has used the Kromayer quartz lamp refers to the work of Daly of Tufts Dental, Mass., who has recently reported 40 cases of pyorrhea treated in this manner. Since April, 1921, this college has given a course of instruction in quartz lamp treatment. The latter was directed primarily against gingivitis and pyorrhea, upon the theory that by destroying the pathogenic bacteria the diseases in question should be arrested. Incidentally it was learned that other conditions were improved, as cellulitis following extraction, inflammation due to poorly fitting prosthesis, mercurial stomatitis, etc. The technic was very simple. After scaling the teeth the light application was begun with one minute exposures increased one minute daily for four days; after which five minute sessions were given daily. The author reports 4 of 14 cases, varying from incipient gingivitis to advanced pyorrhea. His conclusions from his personal experience are as follows: the light treatment, as outlined, is of value in certain oral conditions. It destroys Vincent's bacteria, and, in addition to its bactericidal properties, is a stimulant in the treatment of morbid gum conditions. The results obtained thus far were obtained more rapidly than under other methods now in use. The author adds that the remedy does not benefit all cases of pyorrhea, in which affection all measures sometimes fail.

Determination of Dental Focal Infections by Means of the Radiogram. M. J. Hubbeny, Chicago. Journal of Radiology, December, 1921, ii, 12.

Bone is the tissue which shows in the radiogram and there can be but four reactions to disease which show on the plate, viz., rarefaction and condensation, loss of substance and new formation. We may go as far as to state that whenever there has been destruction of bone around the tooth in question, that tooth should come out. In cases with decalcification about the apex we must bear in mind that such teeth often lead to infection, while in new formation and condensation the converse is true. The periapical rarefaction may show in the plate in several expressions and in all extraction is indicated. Even in a negative x-ray plate if there is suspicion of infection from a well-filled tooth the author would order it pulled; and despite the common experience of the harmlessness of some well-filled devitalized teeth he does not believe in saving them under any conditions. Nothing would be tolerated in any other structure that we tolerate in the teeth—the retention of dead tissue because it gives no trouble. The chief reason, however, is the fact that acute apical infection, which is always liable to develop in these teeth, does not show in the radiogram.

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EDITORIALS

The American Society of Dental Radiographers

THE American Society of Dental Radiographers held a meeting in the Drake Hotel, Chicago, on January 19 at which time the Constitution and By-laws were adopted. After considerable discussion it was decided to limit the membership to those who were members of the National Dental Association and engaged in the practice of radiography or actively interested in it.

The Constitution and By-laws provided for a Board of Directors composed of six men, two of whom would be elected every year to serve for three years. As no election for the Board of Directors could be held before the meeting in Los Angeles, Dr. McKittrick, President, was given authority by the Constitution and By-laws to appoint the Board of Directors to serve until the Los Angeles meeting: He appointed the following: Dr. J. H. Prothero, of Chicago, Ill.; Dr. B. Frank Gray, of San Francisco, Cal.; Dr. Wm. H. Thwaites, of Grand Rapids, Mich.; Dr. Clarence O. Simpson, of St. Louis,

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Mo.; Dr. Arnott A. Moore, of Buffalo, N. Y.; Dr. Chas. F. Chandler, of Montgomery, Ala.

It was decided to hold the next meeting at the Ambassador Hotel, Los Angeles, beginning Wednesday, July 19. It was decided to leave the charter membership open until the Los Angeles meeting and the Secretary was instructed to notify all men who had made application for membership to that effect.

The membership fee also included a subscription to the official organ of publication of the Society of Dental Radiographers, the subscription of the Journal to begin January, 1923.

Dr. C. O. Simpson, of St. Louis, read a paper on "Benefits to be Derived of an Organization of Dental Radiographers," and Dr. Martin Dewey read a paper on "Radiographic Interpretation of Bone Changes as Demonstrated by the Microscope and Microscopic Specimens." These papers will be published at an early date and a copy of the Journal will be sent to all the members of the American Society of Dental Radiographers who have taken up their charter membership by that time. It was voted by the members present to make The International Journal of Orthodontia and Oral Surgery the official organ of the Society.

It is our belief that nothing has ever been done which will be of greater benefit to the profession than the organization of The American Society of Dental Radiographers.

The International Journal of Orthodontia, Oral Surgery and Radiography

At the organization meeting of the American Society of Dental Radiographers held in Chicago, January 19, The International Journal of Orthodontia and Oral Surgery was made the official organ of the Society. In the future the Journal will be known as The International Journal of Orthodontia, Oral Surgery and Radiography.

While the Department of Oral Radiography is not a new feature of the Journal, its value will be increased by the publication of the proceedings of the new Society.

We take this opportunity to extend our best wishes for the success of the American Society of Dental Radiographers.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

National Dental Convention

The Twenty-Sixth Annual Convention of the National Dental Association will be held in Los Angeles, California, July 17 to 21, 1922.

The Ambassador, one of the city's newest and largest hotels, situated in the heart of one of the most beautiful residential districts, will be convention headquarters and practically all sessions can be held in the hotel or on the grounds.

The Local Committee on Arrangements can safely state that this meeting will provide an excellent program, demonstrating that "Dentistry can add ten years to the average of human life." This committee can also safely state that our visitors will be well entertained during their sojourn in Los Angeles.

It is none too early to plan a vacation westward in July, 1922, and to send for hotel reservations.

Watch for further and detailed announcements in all Dental Journals. The Local Committee on Arrangements, C. M. Benbrook, General Chairman, 707 Auditorium Bldg., Los Angeles, California.

Meeting of the American Society of Orthodontists

The next meeting of the American Society of Orthodontists will be held in Chicago, Illinois, at the Edgewater Beach Hotel on April 24, 25 and 26, 1922. A very interesting and instructive program has been arranged by the Board of Censors, consisting of Clinics, Case Reports and Papers of unusual merit. Reservation should be made early in order to secure the best accommodations.—Ralph Waldron, Sec.-Treas.

Alumni Society of the Dewey School of Orthodontia

The next annual meeting of this society will be held on April 27-28th at the Edgewater Beach Hotel, Chicago. The usual high standard of the meetings of this society will be maintained. All interested in orthodontia are cordially invited to attend these meetings. George F. Burke, Secretary, 741-43 David Whitney Bldg., Detroit, Michigan.

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New York Society of Orthodontists

The second regular meeting of the New York Society of Orthodontists will be held at the Vanderbilt Hotel, Park Avenue and Thirty-fourth Street, Wednesday afternoon and evening, Feb. 8, 1922. The following programme will be carried out: 2:00 P.M. *Clinics.* "Indirect Method of Making Plain Bands." (Technic of L. M. Waugh). By W. C. Chapin. "Skeleton Wire Bite Plate." By S. Lewis Kregarman. "Band Technic." By Lourie J. Porter. "A Container for the Distribution of Intermaxilliary Elastics." By Charles A. Spahn. 3:00 P.M. *Papers.* "Some Types of Finger Springs Used on the Lingual Base-Wire." By Martin Dewey. "A Consideration of Normal and Abnormal Dentures as a Problem of Three Dimensional Space and Its Bearing on Orthodontic Classification and Terminology." By Frederick L. Stanton. 5:30 P.M.: Business Session. 6:00 P.M.: Recess. 6:30 P.M.: Dinner. 8:00 P.M.: Essay. "The Influence of Certain Endocrine Glands upon Growth and Development." By Emil Goetsch, Brooklyn, N. Y.—William C. Fisher, Sec'y-Treas., 501 Fifth Ave., New York, N. Y.

The Scientific Section of Oral Surgery

The First District Dental Society of New York will meet Wednesday evening, Feb. 15, 1922, at eight thirty. This will be a joint meeting of the section of Laryngology and Rhinology at the New York Academy of Medicine.

Dr. M. N. Federspiel of Milwaukee will read a paper that evening entitled: "Treatment of Cleft Palate and Hare Lip," discussion will be by Samuel Lloyd, Robert H. Ivy, Philadelphia, Pa., Edward W. Peterson, James S. Green and John E. MacKenty.—Leo Winter, Secretary, 133 west 72d St.

Southern Society of Orthodontists

The next annual meeting of the Southern Society of Orthodontists will be held on March 14 and 15, 1922, at the Piedmont Hotel, Atlanta, Ga. An exceptionally good program has been outlined covering a scientific program including clinics and case reports. All interested in Orthodontia are cordially invited to these meetings.—Dr. C. C. Howard, President, 436 Peachtree Street, Atlanta, Ga. Dr. O. A. Oliver, Sec'y-Treas., 306 Lambuth Building, Nashville, Tenn.

Societe Francaise d'Orthopedie Dento-Faciale

The meeting of the Societe Francaise d'Orthopedie Dento-Faciale held in Paris in January was a great success. The Society, although recently organized, attracted members from Lyons, Bordeaux, Marseilles, Chambery, Lausanne (Switzerland), Brussels (Belgium) and London. The scope of the meeting was almost international. The Society is planning to hold another meeting in Lyons in September, 1922.—Dr. James T. Quintero, Secretary.

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Items of Interest

Dr. A. H. McKibben is now located in the Jenkins Arcade, Pittsburgh, Pa. Practice limited to orthodontia.

Dr. Raymond L. Webster announces the removal of his office to Churchill House, 155 Angell Street, Providence, Rhode Island. Practice limited to orthodontia.

Dr. C. O. Wells announces the removal of his office from room 402 to room 303 Andrews-Law Building, Spartanburg, S. C., for the exclusive practice of orthodontia.

Dr. D. Austin Sniffen announces the association with him of Dr. Franklin A. Squires who will limit his practice to orthodontia and Dr. Charles H. Stimpson to the general practice of dentistry, 20 Church Street, White Plains, N. Y.

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ORIGINAL ARTICLES

EARLY TREATMENT OF MALOCCLUSION*

BY E. A. BOGUE, M.D., NEW YORK

ORTHODONTIA of the permanent teeth will always be needed because of the neglect and procrastination that accompany inexperienced parenthood. It has lost its principal interest for me, because I see before me the possibility of preventing the necessity for such orthodontia, and because I see the possibility of helping to develop the enamel coating of the teeth in such a manner as will prevent the great prevalence of cavities that usually show themselves in childhood, and then, after protracted neglect, appear in adult life in the form of extensive cavities that require attention during the remainder of life if one wishes to keep even with the ravages of decay resulting from defective enamel in childhood.

All abnormalities among deciduous teeth indicate crowding *somewhere,* therefore enlargement of the entire arches of deciduous teeth is always necessary if we try to accomplish regularization of the incoming permanent teeth by using deciduous teeth to accomplish that result.

The second deciduous molars should be 35 mm. apart; 28 mm. as a minimum width is empirical and only to be adhered to until a more scientific pronouncement becomes possible. Narrow dental arches are always symptomatic of past or present arrest in development of the child.

We want to know if we can cause acceleration of development, so as to overtake in some measure what has been lost during the arrest. If so—how? And we want to know the best way to retain whatever development we shall have obtained, including any superdevelopment, which has hitherto been deemed unattainable.

It must be remembered that developmental processes always recommence,

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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Fig. 1.—Case before treatment in 1912.

Fig. 2.—Condition of teeth in 1915.

Fig. 3.—Development of case in 1919.

Fig. 4.—Condition of teeth in 1920.

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5.


6.


7.

Figs. 5, 6, and 7.—Facial development at the time model in Fig. 1 was made.


8.


9.


10.

Figs. 8, 9, and 10.—Facial development at the time model in Fig. 3 was made.

11. 12.

Figs. 11 and 12.—Showing the improvement from 1912 to 1915. Compare Fig. 12 with Fig. 13 for changes occurring from 1915 to 1919.

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if they recommence at all, at the point where they left off or where they originally stopped.

There are three well-known means of aiding in the renewal of the developmental process.

Proper food and exercise is one method; the administration of thyroid or

13. 14.
Figs. 13 and 14.—Illustrating the development from January, 1919, to November, 1920.

Fig. 15.—Arches showing lack of development of patient age five and one-half years.

Fig. 16.—Same case as shown in Fig. 15 after one year of treatment.

other glandular extracts is another; and a mechanical spreading of the dental arches combined with the preceding methods is the third.

It is evident that growth should be promptly renewed in all cases of arrested development because the greatest growth of the brain takes place between birth and six years of age during which period the average increase in size of the brain should be 989 grams while during the period from six to nine-

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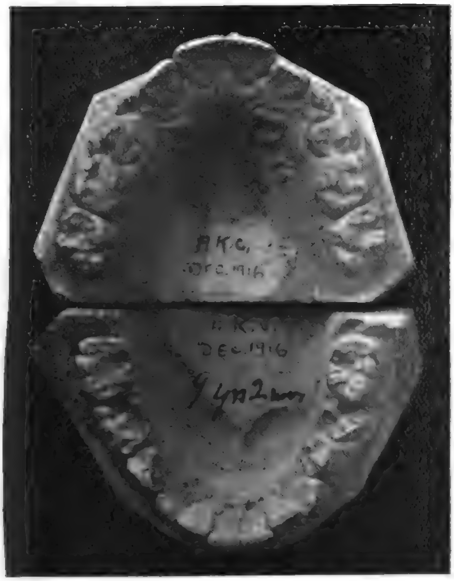
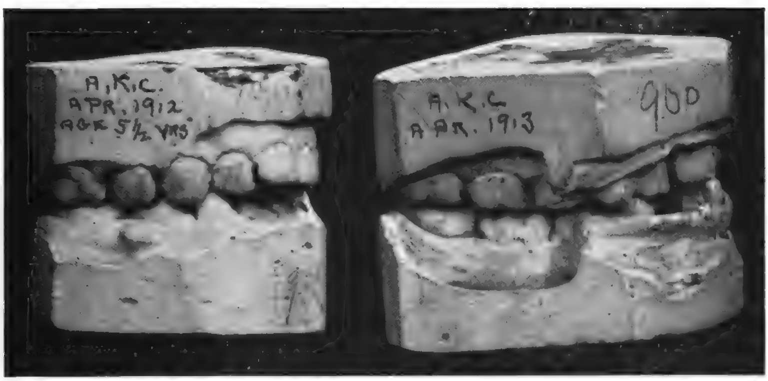


Fig. 17.—Same case as shown in Fig. 15. Patient nine years two months.

Fig. 18.—Shows case at the age of twelve years after the second molars had erupted.

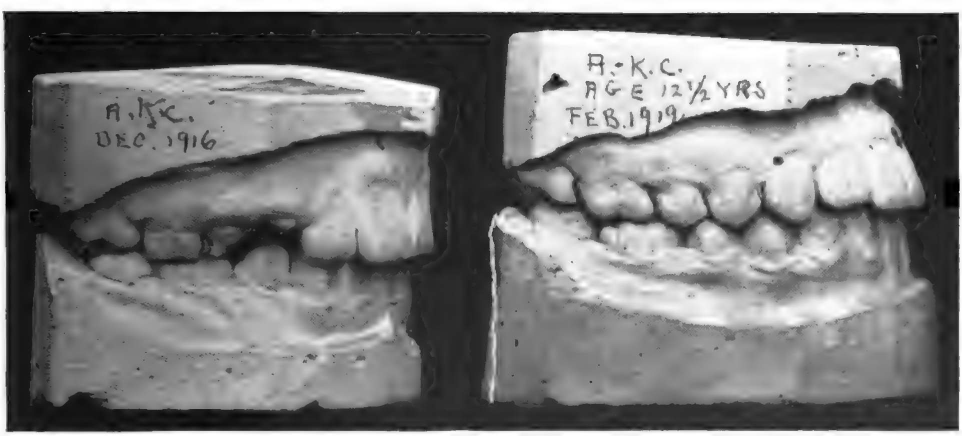
19.



20.

Figs. 19 and 20.—Side view of models. Fig. 19, patient at the age of five and one-half years. Fig. 20, patient at the age of six and one-half years.

21.



22.

Figs. 21 and 22.—Side view of models. Compare with Figs. 19 and 20. Fig. 21, patient at the age of nine years and two months. Fig. 22, patient at the age of twelve years and four months.

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teen years of age, the average increase in weight of brain is only 40 grams.

If mechanical spreading is one of the methods adopted to promote the renewal of growth, this should be done if possible before six years of age; because the lingual root of the maxillary deciduous molar becomes so absorbed

Fig. 23.—Treatment begun at five and one-half years. Note progressive development to fourteen years of age.

Fig. 24.—Same case as Fig. 23. Note the increase in width in the region of the first deciduous molars as shown in first and second model. Also there has been no increase in width from the second to third model.

that this tooth, when moved, can no longer carry with it the crown of the premolar.

When the little undeveloped arches of the child are mechanically enlarged the very fact of their enlargement brings with it a stimulus to growth by the removal of obstructions to growth which have, up to this period, existed. The heart thus has freer action for its circulatory processes for the deposition

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of bony matter, where heretofore there was no room, and for the enlargement up to normality of the adjoining bones and soft parts comprising nose and face and often even the orbital processes. Even the skeleton of the body below feels the impulse of the fuller circulation caused by an unimpeded heart action in an ample thorax.

Fig. 25.—Models showing progressive changes resulting from early treatment.

Fig. 26.—Three models of a case made at six, seven, and twelve years, showing changes resulting from early treatment.

The size of the child's brain at birth and the marvellous growth that normally occurs between birth and the sixth year, seems to call for all the added growth that we can procure in cases where we undertake to enlarge diminutive baby arches.

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I present three cases illustrative of what I have read, all of them having been begun by using the deciduous teeth as instruments for spreading.

The third case is that of a little girl, one of several children in the same family, all begun and finished by using the deciduous teeth only.

DISCUSSION

Dr. Oscar Carrabine, New York City.—Dr. Bogue asked me to discuss his paper and be unmerciful in my attack upon him.

He said, "it is probably the last paper I shall ever write upon this subject."

If that is so gentlemen, we have had a special privilege here today that the future meetings of this Society will never have.

Dr. Bogue is the one man prominent in orthodontia, who has come out openly for treatment of cases before the sixth year.

As the years go by we will more and more realize the great value of this paper, and I feel that this paper is Dr. Bogue's heritage to future generations.

It is difficult to criticize anything he has said, whether he is right or wrong, time only will tell.

Dr. Lawrence W. Baker, Boston, Mass.—Dr. Bogue's paper is a masterpiece. I am not going to attempt to discuss it. I should not dare to change a thought of it any more than I should attempt to alter a line of Gray's Elegy or to add a stroke of the brush to a Sargent. It is a master message from the first generation to the fourth generation. I hope you young men, members of this fourth generation, will take these ideas and thoughts that have been advanced by Dr. Bogue and ponder them long and carefully, remembering in doing so, that Dr. Bogue is the father of early treatment, yes, he is the grandfather, or, to be more exact, he is the great grandfather of early orthodontic interference.

I well remember when I was a child that Dr. Bogue, on his pilgrimages to Boston, usually paid a visit to my father's home and then I had the rare privilege of sitting on his knee and hearing him discuss with my father the germ of the principles which he has expounded here today. Many of us older members present remember how his doctrine of early treatment was criticized, in fact, he was ridiculed and called a crank. But we all have to admit we have learned from him, and now regard early treatment as one of the foundation stones of modern orthodontia.

There is just one more thought I wish to voice, and I am glad Dr. Bogue is here to hear it, for it is this: if my little investigations on the influence of the forces to occlusion on the development of the skull, are of any value, we have to thank Dr. Bogue, for he stimulated me to carry on this work—he did not tell me to do thus and so, but it certainly was his influence that started me in this line of investigation.

Dr. Frank A. Delabarre, Boston, Mass.—As you may perhaps know, I have long been an adherent of the principles Dr. Bogue has presented to you this morning—the idea of early treatment of malocclusion. I will not bore you with any repetitions, but simply give you my impression of the presentation of today's paper by Dr. Bogue. I think it is very valuable. You are working in orthodontia to attain a result. What it is? The establishment of normal occlusion. I sometimes fear that you do not realize your opportunities or possibilities in the treatment of this disorder. The establishment of normal occlusion should be only an incident in the pursuit of your ideal. You should look farther and try to secure all of the benefits that may accrue to your patient through the establishment of normal occlusion, with a comprehension of their breadth and of the influence not only on the physical health of the individuals, but also on their mental caliber as well.

In studying Dr. Bogue's cases at his chair and in his office and reviewing the numerous models he has, covering a long period of years of treatment of individual cases, it has struck me that Dr. Bogue's appreciation is the important thing in undertaking a case for treatment, not only establishing normal occlusion but attempting to give the patient better physical health and a higher mental capacity. He has not worked alone, but has solicited

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the aid of specialists in other branches of the healing art to help him in his work. This is a most broad-minded conception of his responsibilities toward his patients. There is no question whatever but what the results he gets in these respects are magnificent. I would emphasize in particular the wonderful changes that take place in the mental aspects of the case. In treating these children, if we can relieve them from the pathologic pressure in this particular region that is responsible for peripheral nerve irritations, as manifested in a small sense in the everyday disposition of the children in their relation to their associates, where they are cross and peevish and intractible, up to the more severe forms of mental disturbances that are expressed even in the insanities, we can accomplish much. These are phases of our work. It is well recognized that these local peripheral irritations cause these graver disturbances, and by removing them through the establishment of normal occlusion we get relief from St. Vitus dance, from epilepsy, from dementia precox, it makes our work more worth while, and I want you to appreciate that you are dealing not with the small problem of malocclusion alone, but you are dealing with the larger problem of the physiologic health of all the related organs and functions of the individual.

Dr. B. E. Lischer, St. Louis, Missouri.—I am entirely unprepared to discuss this very fine paper by Dr. Bogue. I am frank to say to Dr. Bogue in his presence, I believe the ideals that he has in mind and the work he has done along these lines are very much misunderstood and are not fully appreciated, and I think that as time goes on Dr. Bogue's work will rise higher and higher as a sort of mountain peak for us to look at, and we will all say: "After all, he was right."

I, like one of the other discussors, have undertaken to treat patients of four and five years of age only when they had severe deformities, when I felt a jaw deformity was imminent. I have in minor cases felt that we should let well enough alone and postpone treatment until some later time. However, I have never had a consultation of that kind but what I have strongly impressed upon parents that the case may need treatment, and in my opinion there will be an opportune time to treat the child, and that this *opportune time* must be decided by the man who is going to treat the case. And I always recommend regular visits of such cases to the office for subsequent observation.

Dr. Bogue has shown work here that opens up a new field of thought, because he has shown very clearly that these early treatments permit us to accelerate local development, which has a profound influence upon the general development of the child; and personally I want to thank him for his very interesting and instructive paper.

Dr. Edward A. Bogue, New York City, (closing).—Dean Smith, of the Dental Department of Harvard University, asked me one day to take his lecture hour to discuss Orthodontics of the deciduous teeth. Not a child's skull could be found in Boston, either in the dental or medical schools that had the alveolus cut away in front to show both permanent and deciduous teeth. I have had such a skull since 1894, and it furnishes much of the material that I have given you in this short paper. Fearing that skulls like this are scarce, I have felt a little shy of bringing some matters shown in that skull before a critical assembly like this, without the skull itself.

In 1917, three young men of my acquaintance were unable to pass the physical examination to get into the Army. Studying that skull led me to adapt appliances by means of which I spread the maxillary arch and nasal passages, and enlarged the thoracic cavities of all these three young men, and they all went into the Army. One lies dead in England. The two others have lately been at my house, and thanked me for what was accomplished in their behalf. The effect of these spreadings has been perceptible with all of them from head to foot.

The son of a surgeon was brought to me. I wanted to change his diet. The father replied, "Order what you like and you will get it." The mother had objected to any change in the boy's dietary, but acquiesced in what was asked of her. Some time later she walked in with her little girl saying, "I have come to tell you, in the first place, how grateful I am for what you have done for my boy. He has improved greatly mentally and physically. If you want impressions of my teeth, you are welcome to them, and my two

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other children are at your disposal whenever you think best.'' I found the model of this mother's teeth only twenty-seven millimeters broad at the second premolar region across the upper arch. The arch of one of her children was broader than the mother's.

Now when I first began to notice, some years ago, that the width of the upper arch lay at the bottom of all plans for correction, I called Dr. Ottolengui to my side, and showed him the models of a case, and then showed him the models of the same case three or four months later. Dr. Ottolengui, you all know is a careful observer. He inquired, ''Do you think for a moment that your little wire arches have caused all this spreading at this growing period of the child's life?'' I replied by handing him a model of the same child taken exactly three years previously, together with a pair of compasses, and remarked, ''You will please answer that question yourself, Dr. Ottolengui.'' He measured the model taken three years before, then the model taken three or four months before, and looked up in astonishment. There was not a hair's breadth of difference. ''Now measure the one taken lately.'' He did so, and said, ''There is more than a quarter of an inch greater width in these last few months than there was at the beginning, or three years earlier.'' From that time to this, I suppose, many of us have been keeping track of the widths of the various arches upon which we place our appliances. That individual case was spread too much, but the lips speedily brought the over-enlarged arches back into contact with the lower teeth. The prevailing fault with our orthodontic work on permanent teeth, is that we stop short of sufficient enlargement to allow for the extra growth that takes place between twelve and from eighteen to twenty-four years of age, after the wisdom teeth shall have made their appearance.

One of my professional friends said, ''Dr. Bogue, I do not believe at all in the spreading of deciduous teeth before the permanent teeth shall have made their appearance. They ought to be watched carefully, yes, but I think spreading should all be done when the permanent teeth show that it is required.'' I replied, ''Yes, my dear Doctor, we differ in this respect, you watch that child on the track of an approaching train very carefully, but do not undertake to pull it off the track until after the train arrives, while I pull it off before the train arrives.''

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STUDIES ON THE ETIOLOGY OF ANGLE'S CLASS II MALOCCLUSAL MANIFESTATIONS*

By Milo Hellman, New York

LIKE all other scientific investigations, the search for the causes of malocclusion of the teeth is steeped in difficulties of no slight degree. Unlike similar research in other fields of work, orthodontic investigation is rendered more exacting because of the frail structure of its fundamental principles. So much is taken for granted, so much is assumed, so much is claimed and so much is postulated, that it becomes a veritable task to extricate oneself from the maze of confusing hypotheses in the endeavor to establish a path paved with reliable and scientific evidence by which a definite goal may be reached.

Owing to these circumstances it is essential to approach this problem in a cautious and judicious manner. Thus, before entering upon the search for the cause, it is of utmost importance to determine with as much precision as possible what the nature of this malocclusal manifestation really is. Upon this will depend a clear conception of the scope of this study and its relationship to other, like problems. A broader aspect will then be gained of the significance of the undertaking which in turn will enable us to treat this subject with the care it deserves. To comply with these demands, it is advantageous to divide this topic under the following captions:

1. The biologic aspect of malocclusion of the teeth.
2. The classification of malocclusal manifestations.
3. The causes of malocclusion of the teeth from an historical aspect.
4. Observations on various factors associated with malocclusion of the teeth in general and Class II in particular.
5. An interpretation of the processes of growth in general and its application to the phenomena observed in Class II malocclusal manifestations.

Then, by summing up the evidence, conclusions can be reached that may in a large measure throw some light on the baffling problem on hand.

1. THE BIOLOGIC ASPECT OF MALOCCLUSION OF THE TEETH

Digressions from regularities of all life phenomena are manifest in the various aspects in nature. Plants as well as animals bear abundant evidence of this. The leaves and limbs of trees do not always develop with like regularities. The appendages of protozoa do not always present a strict adherence to uniformity. The shells of molusks quite frequently present aberrations from the natural order of events.

*Read at the Annual Meeting of the American Society of Orthodontists, at Atlantic City, N. J., April, 1921.

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As regards teeth, similar occurrences may be observed. Thus the teet of lower mammals are not always arranged in conformity with an ideal schem For example in the *Suidae* the maxillary incisors occupy a characteristi irregular position with spaces intervening, while the mandibular incisors ar always exceedingly crowded. Those of the *Pecora* are found lapping eac other. Class II (Angle) manifestations are found to occur in the dentition o the horse to the extent of 8 per cent in 58 horses examined. Also in lowe apes occlusal anomalies were observed; as, in *Ateles Ater,* Class III. In th anthropoid apes they are found in various forms. For instance, from th rotation of a single tooth, mostly one of the premolars and to a less degre the maxillary second incisor, malocclusal manifestations were observed t present also deviations belonging to Class II (in the Orang) and Class II in the Chimpanzee.

It is therefore no exceptional incident that similar manifestations ar also found in man. Malpositions of blood vessels and nerves are no un common occurrence. Anomalies in the morphology of bones, muscles an various other organs are also not infrequently observed. Why, then, shoul like manifestations also in the teeth not be expected? Depending as the teet do on a complexity of factors in ontogenetic development, it is but natura that malformation, malposition and the consequent malocclusion should occu That such occurrence is far from being infrequent all of you can attest. Hered ity, environment, food, and disease each plays its rôle in the drama of mal occlusion of the teeth.

The early forerunners of modern man bear abundant evidence of mal occlusion of the teeth. Thus, paleolithic man already presents such abnor malities as may be identified with Class II. In the American Aborigine malocclusion of the teeth is not a very rare occurrence, and the Eskimo pre sents an unexpected frequency of it. The excessive manifestation of thes abnormalities in modern man is therefore not surprising; because, all thing endowed with life present phenomena resembling those manifested in maloc clusion of the teeth in modern man.

2. THE CLASSIFICATION OF MALOCCLUSAL MANIFESTATIONS

Attempts have variously been made at sorting out the various forms o occlusal malrelationship of the teeth. Beginning with Joseph Fox (1803 arrangements into groups of like manifestations were made by Delabarr (1819), F. Maury (1828), Thomas Bell (1829), F. C. Kneisel (1836), Lefoulo (1841), Carabelli (1842), Paul Goddard (1844), M. S. Cartwright (1864), N W. Kingsley (1829-1913), E. Magitot (1833-97) terminating with the division by Calvin S. Case and Edward H. Angle. The classifications of the last tw named are, or should be, familiar to all.

It is not my intention to go into any detail regarding the history or th value of the different classifications of malocclusion of the teeth. That i the function of the historian and the critic. I merely mention this in passing because as I am to discuss the etiology of a *Class,* it is essential to know exactl its significance. Judging by the terminology employed wherever orthodonti is known, it seems to be an undeniable fact that the classification worked ou

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by Angle is universally adopted. It is therefore of advantage to employ it as it is more familiar not only to me but also to the greater number in the profession.

As you are all aware, Angle's groups are known by Class I, II, and III. The distinguishing features of his classification are based upon the "mesiodistal relation of the teeth, dental arches and jaws, which depend primarily upon the position mesiodistally assumed by the first permanent molars on their erupting and locking." (Angle, "Malocclusion of the Teeth," p. 35.)

There has recently been an earnest effort made to substitute names for the numbers indicating the classes. Judging by its general adoption, it seems to have met with decided success. In this scheme, "Distoclusion," for example, is substituted for "Class II." The idea, I presume, was to employ an expressive term instead of the meaningless number. In significance, however, it is obvious that Class II and Distoclusion are synonymous.

It will be of considerable advantage to have a thorough understanding of the meaning of these new terms if a clear conception is to be gained from the interpretation of the evidence to be adduced. Angle's distinction of Class II from the other classes is based on the position of the "Lower arch" as being "distal to normal in its relation to the upper" (p. 57). Dewey defines "Distoclusion, or Class II cases of malocclusion" to be "those that are characterized by a distal (posterior) relation of the lower arch" p. 58). In explanation, it must be stated that mesial or distal, according to Black, refers toward or away from the median line or sagittal plane. The dental arch, as interpreted by Black, is a line bisected in the sagittal plane, corresponding to the proximal contact of the central incisors. This being the median line, the position of each tooth in the dental arch may be described in relation thereto. But the position of the mandibular dental arch or the mandible as a whole cannot be referred to in this manner. To say that the mandibular arch is distal to the maxillary is saying something that cannot prevail. On the other hand, to use the terms *distal* and *posterior* synonymously, as Dewey does, is confusing. Especially so when he employs these terms in defining *distoclusion,* which he describes as being characterized "by a distal relation of the lower arch." There is an old proverb: "When one is to go from one difficulty into another, it is wiser to stay in the first with which he is already familiar." I therefore prefer to employ the term Class II in this discussion. And if for other reasons any justification be necessary, I shall defer it until the evidence will be examined.

Before going any further, it will be of importance to have also an understanding on the significance of the two phases in which Class II appears; namely, division 1 and division 2. The fundamental characteristics are alike in both divisions, i.e., *distal occlusion.* The distinguishing differences given by the authorities in orthodontia are manifested in the position of the incisors and the width of the maxillary arch, etc. Thus, in division one the maxillary incisors protrude, in division two they retrude. In the former the maxillary arch is narrow, in the latter it is *not* narrow, etc., etc.

In my studies on the morphology of the dental arch, I was fortunate to

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find a series of skulls at the American Museum of Natural History of New York, which presented interesting manifestations in this relation. This series consists of 28 Hindoo skulls. They all came from the same locality and present similar physical characters. Among them were 5 that presented malocclusal manifestations known as Class II, division 1. In the others the teeth were in normal occlusion. It was then thought that in such a closely related series definite evidence might be discovered that would corroborate the various hypotheses relating to the physical changes in the mandible, the condyle, the temporo-mandibular joint, etc., ascribed to Class II, division 1. Upon careful examination no distinguishing difference could be discovered in the glenoid fossa, in the condyle, in the neck of the condyle, or in the coronoid process between the mandibles of the normal dentitions and those presenting Class II malocclusion.

The measurements of the angle of the jaw, i.e., the angle formed by the body of the mandible and the ascending ramus, yielded some results. For example, it was found that the two angles of each mandible in all the skulls were not alike, there being differences of as much as 5° in some instances despite the fact that the teeth were in normal occlusion. However, on averaging the general result of the measurements of the skulls with normal occlusion and those with Class II, division 1, malocclusion, some differences were discovered. Thus:

Comparison of the Angles of the Mandibles of Skulls With Dentitions in Normal Occlusion and of Others With Class II Division 1 Malocclusion

	Number	Average	Standard deviation
RIGHT SIDE			
Normal Occlusion	23	60.92°	±6.34°
Class II division 1.	5	66.8°	±5.15°
	(Difference of Average 5.88°)		
LEFT SIDE			
Normal Occlusion	23	59.61°	±6.15°
Class II division 1.	5	64.60°	±4.82°
	(Difference of Average 4.99°)		
BOTH SIDES			
Normal Occlusion	46	60.22°	±6.20°
Class II division 1.	10	65.60°	±5.23°
	(Difference of Average 5.39°)		

From this it may be seen that the Angles of the mandibles of those skulls presenting Class II, division 1, manifestations are more acute than those the dentitions of which are in normal occlusion. The extent to which the angles of the Class II mandibles vary from those of the normal series is on an average of 5°, approximately. In addition to this the standard deviation shows a closer uniformity in the degree of the angles in the Class II mandibles. The range of variability is greater in the angle of the normal than in that of the malocclusal mandibles. It may therefore be safe to say that the *morphological difference in the mandibles of the Hindoo skulls examined having their teeth in normal occlusion from those presenting Class II, division 1, malocclusion, is in the degree of the angle of the mandible.*

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In the study of Class II, division 2, the task is more complicated. First, it is extremely difficult to locate a similar homogeneous series of skulls, and secondly, a like course of procedure would probably not yield similar results. The procedure, therefore, had to assume a different phase. Thus, it is quite familiar to all that the mandibles in *Class II, division 2,* cases are not receded to the extent, if at all, of those in Class II, division 1. This is clearly manifest in the facial expression of the patients themselves as indicated by the prominence of the chin, as well as in anatomic material. It was assumed that in the search of any physical differences in this form of malocclusion other characteristic distinctions may be found. In the full division nothing noteworthy could be discovered. It was then thought that if any particular character should be prevalent, it may be more easily discovered in the subdivision of this division. Three skulls with Class II, division 2, subdivision cases were at my disposal at the American Museum of Natural History. After a careful examination, it was noticed that while the lateral halves of the mandible and mandibular dental arch did not differ, those of the maxillary did. That is, while the mandibles were symmetrical, the maxillae were not. Namely, the molars on the malocclusal side, it was noticed, were located more mesially than those on the normal side. As may be seen in Fig. 1, (occlusal view) the first maxillary molar on the right side is placed considerably more anteriorly to the malar bone than that on the left side. Moreover, on the right side the three molars are more comfortably accommodated and more evenly aligned than those on the left (the normal) side, where they are considerably crowded. Upon examining the jaws in apposition, (Figs. 2 and 3) it will be seen that the crowded left side is the normal one, while the evenly aligned right side is the abnormally occluded one. The same characteristics were evident in the other skulls. Another point of importance is the fact that on measuring the distance between the anterior margin of the foramen magnum and the central fossa of the maxillary first molar on either side, it is found that the dimension on the abnormal side is at least 3 mm. greater than that on the normal side.

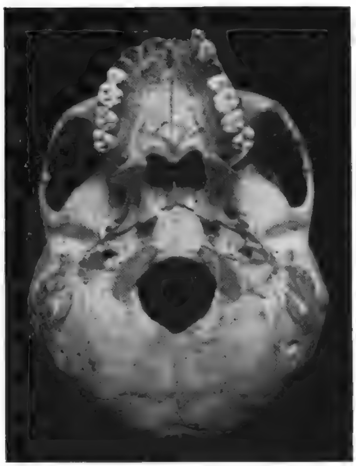

Fig. 1.—Skull of European white, (Am. Mus. Nat. Hist.), occlusal view, showing mesial position of upper right molars. Observe their relation to the malar bone.

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Measurements of casts of 8 Class II, division 2, subdivision cases in practice yielded similar results. The measurements of the casts were made from the incisor point—the point on the gum papilla between the central incisors—to the occlusal extremity of the lingual groove of the first molar. There were no differences found in the dimension on both sides of the mandibular dental arch. The measurements of the maxillary dental arch revealed the fact that the molars on the malocclusal side were at least one millimeter nearer the incisor point than those on the normal side.

From this evidence, it appears that the abnormality of this description does not consist in a distal locking of the mandibular molars but rather a mesial locking of the maxillary molars. The subsequent interpretation of the probable causes of Class II will shed further light on this problem. Owing to this situation, it is preferable to designate these forms of malocclusion by the term Class II, because, this term places no restriction on the interpretation, while the other, (distoclusion) limits our conception to a definite phase which is not borne out by fact.

Fig. 2.—The same skull as in Fig. 1. Right side, showing malocclusal relationship in the molar region.

Fig. 3.—The same skull as in Fig. 1. Left side, showing normal relationship in molar region.

THE CAUSES OF MALOCCLUSION OF THE TEETH FROM AN HISTORICAL ASPECT

A zest of interest is added when our historic records are consulted for references pertaining to the causes of malocclusion in general. Such a vast variety of causes can be discovered therein as to satisfy the most fastidious tastes. Observations are recorded bearing on etiologic problems from the occurrence of irregular teeth as accompaniments to other manifestations, to the most fantastic and scientific conceptions. It is amazing to note how often a cause is discovered and rediscovered and what claim is laid now to originalities of observations that were made decades before.

Hippocrates (460-355 B.C.) for instance, noticed that "among those individuals whose heads are long-shaped, some have thick necks, strong members and bones; others have strongly arched palates, their teeth are disposed irregularly, crowding one another."

By the treatment recommended, it is evident that *Celsus* (50 A.D.) attrib-

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utes the cause of irregularities in the permanent teeth to the retention of the deciduous series. For he says that "if a second tooth should happen to grow in children before the first has fallen out, that which is to shed is drawn out."

Paul Aeginetta, on the other hand, (625-690 A.D.) attributes the cause to the presence of supernumerary teeth. These two ideas prevailed until the beginning of the eighteenth century.

With *John Hunter* (1728-93) the physical aspect of the size of the teeth as the causes of malocclusion assumed considerable importance. Thus, he maintains that "that part of the jaw, which holds the ten fore teeth of the first series, is exactly of the same size when it contains those of the second, and as these last often occupy a much larger space than the first, in such cases the second set are obliged to stand irregularly."

Robert Woofendale (1783) on the other hand claims that it is the presence or absence of the deciduous teeth that controls the future of the permanent series. And, says he, "if proper attention were paid to removal of the first set of teeth, the just symmetry and proportion of the second might be preserved."

Robert Blake (1793), nevertheless, comes to the interesting biologic conclusion that irregularities are really established during the period of development of the permanent teeth in the jaws, despite the fact that the alveolar arches continue to increase during the entire progress of formation of the teeth. Habit as a cause of protrusion of the mandibular teeth is advanced by *John Fuller* in 1810. He claims that the habit "of projecting the under jaw forward" causes it to remain so permanently.

Delabarre in 1819 advanced the idea that general disturbances are a hindrance and retard or prevent "the development of the maxillary bones." Also *F. Maury* (1828) attributes want of development as being due to the condition of general health. He, nevertheless, contends that other prolific causes may be due to defective conformation of the jaw, excessive dimensions of the teeth in proportion to that of the jaw, accelerated development in the dentition of one jaw and retarded development in that of the other, too large size of the teeth in one jaw which does not harmonize with that of the teeth in the opposite jaw.

Contributions on the etiology of malocclusion by *Imrie* (1834, *Kneisel* (1836), *Harris* (1806-60), *Rodrigues* (1839), *De Loude* (1840), *Nasmyth* (1845), *Flagg* (1859), *McQuillen* (1863), *Kingsley* (1829-1913), *Sewill* (1870), *Hepburn* (1870), *Guilford* (1874), *Magitot* (1833-97) and others, added to the factors named a number of other possible causes. Thus, prominence was given to heredity, lack of development of the alveolar arch or of the jaw, too long retention of the deciduous teeth, prevalence of supernumerary teeth, influence of the artificial modes of living brought on by civilization, habits of finger-sucking, thumb-sucking or tongue-sucking. In addition to these *Harris* added disturbances in growth; *De Loude,* small jaws of one parent and large teeth of the other; *Desirabode,* single rootedness of the anterior teeth cause them to be more frequently irregular and organic malady of the alveolar arch is productive of irregularities; *Kingsley,* prolonged use of the artificial nipple, adenoids and mouth breathing; *Fleschmall,* rhachitis.

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J. Lefoulon (1841) through his own studies, observation and investigation, crystallizes his findings in the following etiologic factors:

1. "Constitutional differences brought about by social, economic and geographic conditions.

2. "Prenatal conditions, producing disturbances in size of the deciduous teeth.

3. "Disease processes, like scrofula, that may affect the size of the permanent teeth.

4. "Sounds of speech in which the tongue strikes against the upper anterior teeth pushing them forward."

Bridgeman (1856) not affected by the significance of Lefoulon's ideas adheres to the mechanistic aspect in his three forms of force that cause malocclusion. Namely,

1. *Vis incrementi,* external muscular force, as that exerted by the lips and cheeks.
2. *Vis extensionis,* internal muscular force, as that exerted by the tongue.
3. *Vis occlusionis,* occlusal force.

Another set of factors was conceived by *Thomas Ballard* (1864) on which was based his theory of "Fruitless Sucking." Under this theory, he attributes the diverse forms of malocclusion to be due to erroneous practices to which infants are exposed. Namely, (*a*) being put to the breast before the milk is secreted; (*b*) being allowed to suck at a breast which does not yield as much milk as the infant requires; (*c*) being fed by bottle, fitted with a calf's teat, a piece of wash-leather, a parchment or a long used India rubber teat; or (*d*) being supplied with a sugar teat consisting of some moistened bread and sugar tied in a rag, and given to the child to suck in order to keep it quiet.

Talbot's contribution to the etiology consists in the following: He maintains that "Malnutrition resulting from disease, from insufficient or unsuitable food, and unhealthy environment, is the cause of idiocy, insanity, blindness and other defects. Derangement of the nervous system usually underlies these conditions as found among the poor. But, there is another class of individuals who suffer from neurotic conditions. They are those who are well fed and housed, but have overtaxed their nervous systems by improper modes of life and various forms of excitement. This want of balance produces an osseous system that shows excessive development in some of its parts and arrested development in others." "Nowhere," says he, "is this more manifest than in the maxillae."

With this array of factors advanced as contributing causes of malocclusion of the teeth, there is little that may be desired to gratify the most exacting demands for a suitable explanation of any particular cause of malocclusion.

PRACTICAL APPLICATION OF THE CAUSES OBSERVED

When practical application of all these causes is resorted to, discrepancies arise. This however is not surprising. Because, in addition to careful observations, considerable experience, sound judgment and well founded scientific methods must be employed. The discrimination between cause and

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effect has always been a baffling problem, because the fundamental principles involved are not simple and therefore not readily understood. For example, the development of function is so closely associated with the development of form as to make it extremely difficult to decide which is the cause and which the effect. Great controversies raged on the question of the one being the result of the other and *vice versa*. For instance, "there can be no doubt," says Conklin, "that minute changes of function can frequently be detected where no corresponding change of structure can be seen." It cannot, however, be concluded that function preceded structure. Because, with the ultimate perfection of the microscope, there may be a probability of discovering a corresponding change in structure. The conservative view taken at present is that both function and structure are different aspects of one and the same thing, namely, *organization*.

The attribution of the variously observed causes as etiologic factors of malocclusion has so far been vague, loose and unconvincing. To attribute a certain manifestation to a certain cause does not mean anything unless it can be proved, first, that this cause will always produce such a result, and secondly, that no other cause will produce such a result.

Not many years ago, the late Dr. James G. Lane had the entire etiologic problem of malocclusion in a nutshell. It was all based on the disturbances of the tonsils and the adenoids. Thus, when the adenoids were affected, he claimed that Class II was the result. When the tonsils were diseased, the individual developed Class III. And when both the adenoids and the tonsils were diseased, Class I malocclusion developed. This seems rather an exaggeration of the significance of the adenoids and tonsils in the causative bearing on malocclusion of the teeth. And yet, it is shared by more modern orthodontists than one would be willing to give it credit for. Though it may not be carried to such extremes, it is nevertheless viewed with considerable earnestness.

I shall quote from one of the most exhaustive works on orthodontia, a work that has recently been published and presents orthodontia from its broadest and most modern aspect. I refer to the work by Dr. Martin Dewey, "Practical Orthodontia."

Referring to Class II, division 1, Dewey says: "Mouth breathing has disturbed the forces of occlusion, especially muscular pressure, which has resulted in allowing the maxillary anterior teeth to protrude in the upper arch and in permitting them to remain in an undeveloped condition buccolingually. The underdeveloped mandible and the receding chin are the result of the distal occlusion of the mandibular teeth and the abnormal action of the muscles" (pp. 58 and 149.) He adds that "mouth-breathing has long been recognized as a cause of malocclusion and is generally the result of adenoids." Here, then, adenoids are blamed for Class II, division 1.

"If mouth-breathing occurs early in life," says Dewey, "we find the deciduous teeth as shown in Figure 176 which makes distoclusion with labioversion of the maxillary anterior teeth, or Class II, division 1, the prevailing type. If mouth-breathing occurs after the locking of the first molars, and the cusps of the teeth are long, we find such cases as are shown in Figure 38

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(Class I, resembling Class II, division 1) due to the protrusion of the upper anterior teeth." "In fact, long continued mouth-breathing," contends Dewey, "may be said to be responsible for all the conditions found in Class II, division 1." (p. 439.)

With reference to Class II, division 2, cases Dewey says (p. 467), "the majority of cases and patients seen by the author during his practice, gave a history of having been mouth-breathers at one time, but probably there are other factors that also cause this condition of malocclusion. By far the greater number have had operations for adenoids or have been troubled with nasal obstructions at some time. The author is of the opinion that these patients were at some time mouth-breathers and that the abnormal muscular and atmospheric pressure has permitted the mandibular molars and teeth to assume a position distal to normal. The teeth have protruded, the tongue has been in the lower part of the mouth, and the lips have acted abnormally; then, as a result of an operation or change in environment, normal breathing has become possible and the patient, conscious of the deformity, has closed the lips, with the result that the upper and lower lips have forced the maxillary anterior teeth back against the mandibular anterior teeth. With the tongue held in the upper part of the mouth, the upper arch has developed to nearly the proper width, which development was also stimulated by nasal breathing. As a result of these factors, Class II, division 2, differs from Class II, division 1, in every respect except in distal relation of the lower dental arch. The upper teeth are bunched and retruding, the upper arch nearly the normal width, the mandible nearly normal in development, and the chin normal or well developed. These last conditions have all been the result of normal muscular and normal atmospheric pressure." (p. 468.)

These statements are quoted not for the purpose of criticism or with the intention of condemning the views expressed. They are merely brought to your attention because they represent the concurrent opinion maintained by the profession.

OBSERVATIONS ON VARIOUS FACTORS ASSOCIATED WITH MALOCCLUSION OF THE TEETH IN GENERAL AND CLASS II IN PARTICULAR

It is a scientific fundamental requirement that all hypotheses should be verified and that verified hypotheses must be guaranteed by *proof*. Scientific proof again is a definite method which is sharply distinguishable from historical proof or proof in the popular sense.

"When a new discovery is made in science," says Knight Dunlap, Professor of experimental Psychology in the Johns Hopkins University, "the statement of the discoverer, that such and such a phenomenon has occurred, has in itself no scientific value. The discoverer must formulate the experimental conditions under which the phenomenon described may be observed by any one whose scientific training has been adequate."

It will be evident that these conditions are not fulfilled in the statements quoted. The privilege, therefore, of treating this problem in a scientific manner is granted to all. It will consequently be of considerable gratification to

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bring before this meeting the results of observations made in connection with the problem of the cause of malocclusion in general and Class II cases in particular.

Seth K. Humphrey in "Mankind" calls attention to the fact, that "In his physical aspect, man, given anything like normal conditions, develops true to image predetermined by inheritance, down to the last item in his anatomy. It is a remarkable fact that physical inheritance yields very little to any environmental influence, short of malnutrition, accident and disease—and these three are abnormal conditions."

To approach the problem of etiology in a scientific manner, we must proceed from the fundamental aspect of these conditions; that is: nothing but malnutrition, accident and disease will affect the physical inheritance of man. If we consider malocclusion of the teeth as representing a modification of his physical inheritance then it must be due to one or all of these conditions. Of course, accident may be dispensed with as it is directly traceable and is a matter of chance or even carelessness rather than fate.

It is therefore of interest to know in what relationship nutrition and disease may stand to malocclusion of the teeth. Nutrition, for example, plays an important rôle in all phases of life. The development of the teeth and the jaws depends to a large extent on the nutritional processes at a very early period of life. Nursing is the normal process of feeding the human offspring. Any deprivation of the infant from this source of food will bring about untoward conditions of various sorts and at the same time have a harmful influence upon the individual as a whole as well as upon tooth formation and jaw development.

The examination of 354 children, both boys and girls, ranging in age from 3 to 15 years, revealed the fact that 71 or 19.94 per cent were breast-fed, 86 or 24.17 per cent were bottle-fed and 199 or 55.89 per cent were breast-fed for a short time (from a few days to about six weeks) and later had to resort to the bottle. Both the bottle-fed and breast-and-bottle-fed numbered 285 or approximately 80 per cent. Normal occlusion of the teeth among these children existed to the extent of 3 per cent while 97 per cent had various forms of malocclusion. From an inquiry into the general pathologic disturbances that 310 of these children were afflicted with, the list shown in Table I was constructed.

As will be evident from Table I, the diseases occurring in more than 20 per cent of the cases examined are measles, chicken pox, whooping cough, affections of the adenoids, affections of the tonsils and sucking habits. The rest of the diseases as may be seen appear in such small numbers as to warrant no special mention. If disease processes be assumed to have a certain bearing on malocclusion of the teeth, it would be reasonable to name those that appear most frequently in their association. These would be, measles, 60 per cent, chicken pox, 41.61 per cent, whooping cough, 50.32 per cent, adenoids, 61.61 per cent, tonsils, 52.9 per cent, and sucking habits, 29.03 per cent. The habit of sucking, though not belonging to disease processes, was included in the list merely for the sake of convenience.

On arranging the distribution of the most frequently appearing disturb-

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TABLE I

DISTRIBUTION OF DISEASES IN 310 CHILDREN EXAMINED

DISEASES	NUMBER	PERCENTAGE
Measles	186	or 60.00%
Chicken pox	129	" 41.61%
Scarlet fever	33	" 10.65%
Eczema	14	" 4.52%
Bronchitis	9	" 2.90%
Whooping cough	156	" 50.32%
Asthma	2	" .65%
Diphtheria	11	" 3.55%
Pneumonia	22	" 7.09%
Affection of the Adenoids	191	" 61.61%
Affection of the Tonsils	164	" 52.90%
Mastoiditis	5	" 1.61%
Adenitis	19	" 6.13%
Intestinal Disturbances	37	" 11.93%
Appendicitis	8	" 2.58%
Convulsions	3	" .97%
Nervousness	27	" 8.71%
Anemia	4	" 1.29%
Rickets	7	" 2.26%
Rheumatism	6	" 1.93%
Mumps	40	" 12.90%
Finger, tongue or lip sucking habit*	90	" 29.03%

*This habit though not a disease is included in the list merely for the sake of convenience.

ances, in accordance with the different classes of malocclusion, in Table II, it is found that there is no indication of any particular grouping. For example, mouth-breathing and its cause, adenoid vegetation, which is generally blamed for Class II manifestations is equally divided between Class II and the other classes. The only instance in which there seems to be a positive correlation

TABLE II

DISTRIBUTION OF DISEASES EXPRESSED IN PERCENTAGE

DISEASES	NUMBER	CL.II DIV. 1	CL.II DIV. 2	OTHER CASES
Measles	186	34.94	13.97	51.07
Chicken pox	129	40.31	11.62	48.06
Scarlet fever	33	30.30	9.09	60.6
Eczema	14	28.57	14.28	57.13
Bronchitis	9	22.22	11.11	66.66
Whooping cough	156	36.54	13.97	51.07
Asthma	2	0	50.0	50.0
Diphtheria	11	54.54	0	45.45
Pneumonia	22	36.36	4.54	59.99
Affection of the Adenoids	191	37.74	13.08	49.21
Affection of the Tonsils	164	34.14	14.02	51.82
Mastoiditis	5	40.	40.	20.
Adenitis	19	47.36	15.79	36.84
Intestinal disturbances	37	27.02	10.81	62.16
Appendicitis	8	37.5	0	62.5
Convulsions	3	0	0	100.
Nervousness	27	37.37	22.22	40.74
Anemia	4	50.	50.	0
Rickets	7	0	0	100.
Rheumatism	6	50.	0	50.
Mumps	40	40.	10.	50.
Finger- tongue- or lip-sucking habit*	90	60.	2.22	37.77

*This habit, though not a disease, is included in the list merely for the sake of convenience.

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is sucking habits and Class II, division 1. In this particular 60 per cent of those possessing this habit present Class II, division 1, cases.

TABLE III

COMBINATION OF DIVERSE FACTORS IN PERCENTAGE

	NUMBER	CL.II DIV. 1	CL.II DIV. 2	OTHER CLASSES
Adenoids and Tonsils	167	35.32	14.97	49.70
Breast, Adenoid and Tonsils	30	40.	13.33	46.66
Bottle, Adenoids and Tonsils	9	77.77	0	22.22
Breast, Ade., Tonsils and Sucking	134	35.82	13.43	50.74
Bottle, Ade., Tons., and Sucking	40	60.	5.	35.
Bottle and Sucking	72	58.33	2.77	38.88
Breast and Sucking	13	84.61	0	15.38
Bottle, Whooping, Sucking	32	59.37	6.25	34.37
Breast, Whooping, Sucking	10	60.	0	40.
Measles, Chicken Pox	105	36.19	12.38	51.42

If we now combine the most frequently appearing disease processes with the breast-fed and the bottle-fed, and note their relationship to the different classes of malocclusion, very curious results are obtained (see Table III). *First,* it is found that tonsil and adenoid disturbances occurring simultaneously have no closer correlation to Class II than to the other classes. *Second,* when breast-feeding or bottle-feeding with adenoid and tonsil disturbances are grouped together, they present an approximately equal distribution between Class II and the other classes. *Third,* when the sucking habit is included in any of the groups shown in Table IV, the percentage is considerably higher in Class II cases. And lastly, most curious of all is the fact that the combination of breast-feeding and sucking shows the highest percentage in Class II, division 1.

It may, therefore, be quite safe in saying that the habit of sucking is the only factor that stands in intimate and positive relationship with Class II cases and especially with those in division one. In this connection, it may also be stated that by far the greatest number were finger or thumb suckers (72). The next large group constituted the "pacifier" suckers (23). And the others sucked the tongue (3), the lip (2), the blanket (1), and a handkerchief (1).

An effort was made to discover the time of the beginning of the habit of finger-sucking, i.e., when it was first observed. In every instance the parent could not remember when the baby did *not* suck his finger. In a number of observations I noticed that babies sucked their fingers immediately upon delivery. Whether this habit is acquired during labor or immediately after birth or whether it is practiced before birth is difficult to ascertain. In view of the fact that the hands and fingers are in close proximity of the mouth *in utero;* and in view of the fact that the hands are employed in depressing the jaw during the formation of the hard palate, as is contended by Michio Inouye, it seems not improbable that this habit may be an acquisition that antedates birth. If future investigation shall prove this to be true, it will be quite evident why there is a relationship of this habit and Class II, division 1, and why the angle of the mandible is so modified as to correspond to the description given above.

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5. AN INTERPRETATION OF MALOCCLUSAL MANIFESTATIONS ON THE BASIS OF THE PHENOMENA OF GROWTH

In lieu of more extensive embryologic evidence bearing on this phenomenon, it is of importance to have a general conception of the intricacies involved in the problem at hand. Malocclusion of the teeth is essentially an expression of some discrepancy in growth. Growth, as generally understood, is a process of gradual accretion of body substance until the adult size is reached. But when the adult size is reached, it is observed that not all the individuals are of equal proportions. Some are small, some are tall, some are frail, some are stocky. These differences, it is found, may be associated with differences in races, with differences in sexes of the same race, with differences in groups of the same race and sex under different social or economic conditions, with differences in individuals of the same race, sex and group, and also with differences in parts of the same individual. Thus, long bodies and short limbs are no uncommon occurrence as are long limbs with short bodies. Large heads associated with small individuals are as frequent as small heads with tall individuals, etc., etc.

The popular attitude is to assume that growth begins after birth. It must therefore be explained that growth occurs as a constant manifestation from the fertilization of the egg to the completion of the adult individual. But it does not proceed with the same speed. There are periods when growth is accelerated and others when it is retarded. These accelerations and retardations bring about differences in the proportions of all that is growing. For example, as measured by weight and height, the growth of the entire body takes place at a very rapid rate up to the fifth month of fetal life. After that, the body keeps on growing but the rate at which growth takes place is much slower until about four years before puberty. At this period, the rate is once more accelerated to be retarded again after sexual maturity. As sexual maturity occurs earlier in girls than in boys the former will accelerate at an earlier period and really be taller than the latter at a certain age.

These accelerations and retardations bring about certain results. That is, they create differences. For instance, accelerated individuals will grow taller at an earlier age. Retarded individuals, on the other hand, will be smaller during the period of retardation and in some instances make up their loss during the period of acceleration. But if the period of acceleration itself is retarded, i.e. delayed, in retarded individuals, they are confronted with a great difficulty. Namely, they have to make up at a later period and in a shorter time all they have missed. Growth then may occur at a tremendous rate and at an enormous expenditure of energy. But owing to the shortness of the period involved, it is questionable whether it is at all possible to make up during a short acceleration period of growth the loss that an extended period of retardation caused. In fact, Professor Boas has found that when children are retarded in height up to the twelfth year they remain permanently short in stature.

These general considerations are applicable to all phenomena of growth. Whether it is the growth of the body as a whole or of the various constituent

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parts of the body, they are all subject to these general and inexorable laws. Moreover, it must be remembered that these phenomena are normal and physiologic manifestations. When, however, pathologic conditions intervene, these processes are considerably accentuated. And instead of producing variations in type, they bring about abnormalities. Thus, for instance, retardations in size complicated by thyroid disturbances bring about not only diminished stature but also mental deficiency. On the other hand, acceleration in growth when complicated by hyperpituitarism, brings about not only gigantism, but also inhibition of sexual desires. Thus, pathologic conditions simply accentuate or exaggerate such physiological manifestations as are observed in *retardation* and *acceleration*. For example, if cleft palate be considered from this aspect, it will be evident that it is a manifestation not only in the failure of union of the palate processes alone, but rather owing to the extended retardation in growth of these processes, the stage of union is not reached. That there is an abnormal retardation in such cases, probably due to pathologic conditions, is evident. Because, in most of such cases, there is not only a lack of union and growth of the palate processes alone, but there are usually also deformed teeth and completely missing dental germs as well as a consequent lack of growth of the upper alveolar process and possibly also the body of the upper jaw bone.

Excessive retardations in the eruption of teeth are often the cause of permanent impactions. This becomes evident upon reflection on the prevalent frequency of impacted third molars. These teeth erupt at a late period in the growth of the individual. Retardation of the processes of growth in general at that period is excessive. The normal eruption of the third molars occurring so late is usually accompanied by difficulties. Pathologic conditions, due to the difficulties involved, complicate this process. As a result, the period of eruption *per se* becomes excessively stretched, and invariably prevents these molars from assuming a normal position even when completely erupted. In the greatest number of cases as you are all aware, they remain imperfectly erupted or entirely impacted.

On the other hand, accelerations in the eruption of teeth produce difficulty of another sort. Thus, for instance, the early eruption of the mandibular permanent canine teeth, which is a frequent occurrence, brings about modifications in occlusion, because the necessary space for them is not normally allotted before the shedding of the mandibular deciduous first molars. Again, the acceleration in the shedding of a deciduous tooth and the retardation of its permanent successor find expression in the many forms of malposition of the teeth with which you are well familiar.

Just as the palate processes in cleft palate may fail to unite because of lack of growth and just as the teeth may remain permanently impacted because of extensive retardation in eruption, so there may be various shades of retardations in growth at the time the head develops. During the embryonic period of the head formation, growth occurs at its highest rate. Things happen very swiftly. If retardations occur, they need not necessarily last long to cause growth of certain parts to fall behind the rapidly forming

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organs. An excessive retardation in the frontonasal process and the future nose and premaxillary bones will never be able to make up their loss. An acceleration in growth in one or both of the lateral processes and a condition as may be associated with Class II, division 2, is not unimaginable. An acceleration or retardation in the growth of the mandible and Class II, division 1, or Class III may be the result. To what extent these retardations and accelerations may influence morphogenesis when hereditary or pathologic factors are involved is as yet difficult to make even a reasonable guess. It is, however, difficult to refrain from these assumptions because the trend of modern experimental investigation is definitely heading in that direction. It therefore will depend on the investigations in the very near future to corroborate and perhaps verify these assumptions. Meanwhile, it is worth while to keep them in mind.*

Another aspect to be assumed in the interpretation of the causes that modify growth and accentuate the retardation and acceleration phenomena is that concerning the influence of nutrition and diseases after birth. As shown recently by McCollum, it is possible to produce experimentally tall rats and small rats; well rats and sick rats; rats with keen eyesight and rats with impaired eyesight; and many other things of a like nature. And all this can be done by means of nutrition. The sad experiences of the late war show results of a similar character in the offspring of man, mainly due to shortage of certain foods.

Even if we choose groups of children belonging to different economic strata of the same race and nation, the effects of food and other care will be manifest. Tables IV and V show the effect of the differences in economic conditions on stature and weight in two groups of girls. Note the difference in both height and weight, the wealthy group exceeding the poor by an average of five inches in height and 12 pounds in weight. It is of considerable significance to note that the retarded group (the poor) did not make up in stature despite the fact that in weight they regained their loss during the period of acceleration.

Another aspect must be brought into consideration at this point. "Up to the present day," says Lowie, "the determination of causes, *rerum cognoscere causas,* has been commonly assumed as the ultimate aim of scientific investigation. But in recent times advanced thinkers among philosophers of science have found the concept of causality lacking in definiteness and are supplanting it with the mathematical concept of function. From their point of view, the entire universe appears as an assemblage of elements more or less closely dependent on one another, and the object of science is to ascertain the *functional* relationships of these elements."

"What precisely, are you to understand by the term 'function'?" *The quantity "y" is a function of the quantity "x," if "x" and "y" are so related that to every value which "x" may assume there correspond one or more values of "y."*

*When I wrote this I had no idea what Dr. Johnson was going to say at this meeting. My intention was to express the general fundamental ideas involved in this process. The embryonic stages shown by Dr. Johnson fully illustrate these truths.

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TABLE IV

STATURE* OF GIRLS

AGE IN YEARS	NO. OF CASES	POOR AVERAGE	STANDARD DEVIATION	NO. OF CASES	WEALTHY AVERAGE	STANDARD DEVIATION
5	17	40.80	±3.96			±1.38
6	33	43.16	±3.63	7	46.72	±1.38
7	40	44.92	±4.61	17	49.05	±2.28
8	45	47.11	±5.41	32	51.03	±2.26
9	55	50.20	±5.21	56	52.28	±2.05
10	49	50.88	±2.56	28	55.46	±2.29
11	51	52.74	±3.12	34	56.05	±2.90
12	43	54.87	±3.49	27	59.28	±3.28
13	40	56.70	±3.03	23	61.48	±2.21
14	33	58.27	±3.16	23	62.48	±3.00
15	12	58.84	±3.05	8	62.87	±2.20

*In inches.

TABLE V

WEIGHT* OF GIRLS

AGE IN YEARS	NUMBER OF CASES	POOR AVERAGE	STANDARD DEVIATION	NUMBER OF CASES	WEALTHY AVERAGE	STANDARD DEVIATION
6	33	42.69	± 5.48	9	51.56	± 8.95
7	40	45.62	± 5.07	18	54.28	± 8.85
8	46	50.76	± 6.80	31	60.96	±10.14
9	54	60.37	± 8.67	56	64.52	± 9.29
10	49	63.18	± 9.00	28	75.05	±13.45
11	51	69.98	± 9.67	34	81.00	±15.68
12	43	81.47	±12.42	27	88.14	±12.56
13	39	88.34	±13.26	23	101.30	±14.49
14	32	101.31	±16.92	23	111.00	±24.57
15	12	105.08	±10.95	8	106.63	±12.88

*In pounds.

Thus, the cost of a loaf of bread is a function of its weight because the greater the weight the greater, everything else being equal, is the cost. The ascent to the top of a modern "sky-scraper" is a function of time because the greater the height, the longer, other things being equal, it will take to get there. The efficiency of the masticatory apparatus is a function of occlusion because the nearer the normal the occlusion, other things being equal, the more perfect is the function of mastication. Similarly, the resistance to diseases may be said to be a function of proper nutrition because the more proper the nutrition, other things being equal, the greater the resistance to disease processes.

Tallness, claims McCollum, has nothing in common with well-being. By proper food, tall animals can be reared. But these may not be *well* animals. Thus also on examination of the tall children with reference to other conditions, differences are found that are of considerable significance. For example, some of these children were bottle-fed in infancy, while others were breast-fed. If a comparison be made of these children as to the ability to resist disease, interesting data are obtained. Thus recording the number of diseases of each individual before appearing for examination, the following figures were obtained.

	NUMBER OF CASES	AVERAGE OF NO. OF DISEASES	STANDARD DEVIATION
Bottle-fed	86	5.59	±2.22
Breast-fed	70	4.04	±1.83

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It must be explained that differences between two compared series may be *real* or they may depend on *accident*. We must remember that any group we may weigh or measure is, theoretically at least, composed of an infinite number of constituents. The number under our observation, on the contrary, is limited. An error of the average of a limited series may therefore arise, but it can be measured. The error of the average, as compared with that of an ideal, is measured by the ratio of the deviation to the square root of the number of cases, thus, $\frac{\delta}{\sqrt{n}}$

Therefore,

The error of the first average is $\frac{2.22}{\sqrt{86}} = \frac{2.22}{9.27} = .23$ and

The error of the second average is $\frac{1.83}{\sqrt{70}} = \frac{1.83}{8.36} = .21$

The error of the difference is $\sqrt{.23^2 + .21^2} = .3$

The difference of the average is 1.55, about five times as great as the error. A difference to be real must be at least four times as great as the error. It is, therefore, quite safe in saying that there is a real difference in the incidence of diseases between the breast-fed and the bottle-fed.

A comparison of the breast-fed and the breast-and-bottle-fed yielded similar results. Thus,

COMPARISON OF BREAST-FED AND BREAST-AND-BOTTLE-FED

	NUMBER	AVERAGE OF DISEASES	STANDARD DEVIATION
Breast-and-bottle-fed.	195	5.06	± 1.81
Bottle-fed.	70	4.04	± 1.83

The error of the first average is $\frac{1.81}{\sqrt{195}} = \frac{1.81}{13.96} = .13$

The error of the second average is $\frac{1.83}{\sqrt{70}} = \frac{1.81}{8.36} = .21$

The error of the difference is $\sqrt{.13^2 + 21^2} = .24$

The difference of the average is 1.02 more than four times as great as the error, therefore a real difference.

It was then assumed that there might be a possible correlation between a certain form of malocclusion and a higher incidence of diseases. Calculations brought forth the following results.

COMPARISONS OF OCCLUSION AND INCIDENCE OF DISEASES

	NUMBER	AVERAGE OF DISEASES	STANDARD DEVIATION
Normal Occlusion	10	4.4	± 1.50
Class I	150	4.62	± 2.19
Class II div. 1	102	5.39	± 2.15
Class II div. 2	40	4.63	± 2.20
Class III	11	6.1	± .94

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As may be observed, there are differences in the averages obtained. Upon calculation by the above method, it was found that they are not real but only accidental. It may therefore be safely stated that, while bottle feeding is correlated with a higher incidence of diseases, due probably to inadequate food properties in cow's milk, and while it may thus give rise to a higher occurrence of malocclusion this incidence shows no correlation with any *particular* form of malocclusion.

SUMMARY

In summing up what has been brought forth in this contribution, the following points will become manifestly evident:

(1) That irregularity of the teeth or of any other organ is a biologic phenomenon and may occur in all living things.

(2) That malocclusions due to irregularities of the teeth, like the disturbed functions due to irregularities of other parts of animals and plants, are biologic phenomena.

(3) That attempts at classifying the irregularities and malocclusion of the teeth have been made as early as 1803.

(4) That these attempts terminated in the simple classification worked out by Angle which is accepted throughout the world.

(5) That the basis of Angle's classification does not prove satisfactory with respect to the divisions of Class II manifestations.

(6) That in skulls presenting Class II, division 1, the mandible is found to present a more acute angle than those belonging to skulls with normal occlusion. The body of the mandible therefore assumes a more posterior position in relation to the maxilla than in the normal skulls. The teeth of the mandible are therefore in distal occlusion.

(7) That in skulls presenting Class II, division 2, manifestations, there appears a reversal of this condition, i.e., the maxillary alveolar process appears to have drifted anteriorly; the teeth therein contained are consequently in mesial relation to those of the mandible.

(8) That various factors of malocclusion accepted by the modern orthodontist date back many centuries. Most of them have come down to us by tradition, and accepted on no other grounds but by the recommendations of some authority.

(9) That when put to test not one of the recommended factors is found to bear any definite relationship to a particular form of malocclusion.

(10) That the only factor found in close and positive relation to Class II, division 1, is the habit of sucking.

(11) That malocclusion is essentially an expression of some discrepancy in growth.

(12) That growth, though occurring as a constant manifestation from the fertilization of the egg to the adult size of the individual, is modified by retardations and accelerations.

(13) That accelerations and retardations when influenced by pathologic conditions result in deformities.

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(14) That the development of the jaws and teeth are similarly subject to these retardations and accelerations.

(15) That 80 per cent of the individuals examined were bottle-fed.

(16) That the bottle-fed individuals present a higher incidence of diseases due to the artificial nature of the food.

(17) That of the individuals examined with reference to diseases 97 per cent had malocclusion of the teeth.

(18) That there is no correlation found between disease processes and any definite form of occlusion.

(19) That accelerations and retardation in growth influenced by pathologic conditions may explain the modified mandible in Class II, division 1, and the overdeveloped lateral portion of the upper alveolar arch and the concomitant underdeveloped premaxillary bone in Class II, division 2..

It may, therefore, be safely concluded,

(1) That mouth-breathing is not specially concerned in the production of Class II any more than it has influence to produce Class I.

(2) That the sucking habit has a *positive* though not exclusive relationship to Class II, division 1.

(3) That artificial feeding stands in direct relation to a higher susceptibility to pathologic conditions.

(4) That pathologic conditions have an exaggerating or activating influence upon retardation and acceleration in association with growth.

(5) And that retardations and accelerations associated with growth, influence the formation and completion of the masticatory apparatus as they do everything else that depends upon growth and development for its perfection. And, therefore, they also have an influence in the retarded development and diminutive size of the mandible with distal occlusion in Class II, division 1, and the forward drifting of the maxillary lateral halves with mesial occlusion of the maxillary teeth in Class II, division 2.

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DISCUSSION

The President.—You have heard this splendid paper of Dr. Hellman, which is really too long to discuss, but it shows a great deal of study and will become of great value to us when it is published. However, there are some men here who probably would like to discuss it, and I will throw it open for discussion for a short time.

Dr. Oscar Carrabine, New York City.—Dr. Hellman's paper is too scientific for the ordinary man to discuss. I shall not try to discuss it, but, I have an idea in reference to the cause of Class II cases that I should value Dr. Hellman's opinion.

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I believe that we will all agree that Class II cases have been on the increase in the last twenty years, is it possible that the installation of steam heat in our homes is the great irritant that causes the inflammation of the adenoid tissue?

Dr. George F. Burke, Detroit, Michigan.—The essayist states that thumb-sucking is one of the causes of Class II cases. A great many of us know from experience and as a result of inquiry among mothers, that nurses, when babies are born, in order to keep them quiet, slip the thumb in the mouth. In a number of cases this bad habit is continued by the mothers after the nurses leave.

Not long ago a committee from the National Dental Association drew up a set of resolutions calling attention of the hospital authorities throughout the United States to the need of employing competent dental service in hospitals, which no doubt will have far-reaching effect. Why is it not possible for some good to come as a result of this paper, whereby a committee representing this Society would be instructed to draw up a set of resolutions dealing with the evil effects of thumb-sucking and have same published in the various nurses' publications, thereby educating them relative to the harm done to both the teeth and facial expression through such practices. The Hold-In-Hand-Mits have been found in my practice to be the most effective in breaking up this habit in early childhood. They are also helpful in nail-biting.

Dr. B. E. Lischer, St. Louis.—I would have given a great deal for a copy of this paper before coming to this meeting, because I cannot discuss it extemporaneously in a manner such as this valuable contribution merits.

I am afraid Dr. Hellman does not understand the terminology he has tried to knock down today, and I think it will not be many years before he will say so. He left the impression with me (now I may be wrong) that the terminology officially adopted by this Society was merely terminology. I think I had something to do with that terminology when it was first proposed, and I can truthfully say that your committee was not merely trying to put over a few new terms. We were really striving to free the orthodontic mind from certain narrow ideas; to us it meant the formulation of a proper conception of the pathology of oral deformities. It is undeniably true that the mastery of word-forms promotes the acquisition of ideas. Unfortunately, "the forms of expression first chosen are not always adequate to keep pace with the progress of science. Hence they must be radically changed and formed anew to meet the new demands." This is a problem with which every science has to deal.

Dr. Hellman showed a slide of a skull which he said presented a "Class II, Division 2, subdivision case". He took measurements from a point on the anterior border of its foramen magnum to a given point on each first permanent molar, and on one side found the molar mesial to the extent of three millimeters. He does not tell us which side was normal, yet he calls it a Class II case. Hence I ask, might not such a case be one of *mesioversion* of the molars and premolars on the side where they were three millimeters anterior to those of the other side?

In my paper yesterday I spoke of the inadequacy of an *exclusive occlusal interpretation*, and last night a number of my friends here (many of whom are older than I am and whose judgment I respect) said that I was right. Please note, too, that while Dr. Hellman clings to his "meaningless numerals" in the introduction, he uses the word *distoclusion* quite freely throughout the paper.

He also spoke of causative factors, and left the impression with me (again I may be wrong) that certain biological factors always operate in a certain way. I doubt the accuracy of such a statement. For example let us take scarlet fever. In one child it causes an otitis media; in another it results in nephritis; in a third child the end result may be a cardiopathy of some kind.

Dr. A. LeRoy Johnson, Boston, Mass.—There seems to be a confusion of ideas as to the meaning of cause and factor. Cause in a literal sense means that which produces a result without which it would not exist. It is also the sole determining effect of a condition.

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On the other hand a factor is one of a number of elements which combined together produce a result. It seems to me that the evidence which Dr. Hellman has presented illustrates this difference very clearly. The forces which determine the development of any part of a living organism are so complex that we must, rationally, when referring to etiology, speak in terms of contributing factors, not of cause, in the definite literal sense.

Dr. Milo Hellman, New York City (closing).—Mr. President, it seems to me that all the questions raised in the discussion are adequately answered in the paper itself. The fact that my paper impressed Dr. Lischer in a certain way does not change its true meaning. We can all read a certain book and yet each one of us will be differently impressed by it. This however does not make any difference to the true meaning of the book. Dr. Lischer credits me to maintain that "certain biologic factors always operate in a certain way." I am quite sure that he will change his mind after he will have read the paper. I showed that the various diseases were equally distributed amongst all classes of malocclusion, so that you cannot trace any one to a particular class. Habit is one manifestation that has a positive relationship to Class II, division 1. It is, however, not an exclusive relationship. Regarding the terminology I can do nothing better than direct Dr. Lischer's attention to the explanations offered in the context of this paper.

As regards the effect of steam heat on the atmosphere and that on adenoid tissue which in turn causes Class II, it would seem that we are going back to Lane's etiology. Lane's etiology looks exaggerated, and yet it is maintained by most of you. In answer to Dr. Carrabine's query, I will say that a dry atmosphere has as yet not been proved to be the *only* etiologic factor of inflamed mucous membranes. *Infection* has something to do with it. And even if it were so, it certainly does not show to have any particular bearing on Class II, any more than it has on Class I, Class III, or normal occlusion.

Another thing as explained in this paper, is that Class II is also found in horses. Whether they lived under the same atmospheric conditions as we do I do not know.

The point that I wished to impress is, that in the study of etiology we have to begin from the bottom. We must first learn to grasp the biologic principles involved in life as a whole. If we want to build anything at all, we must place our structure on a firm foundation. Anything pertaining to life must be based on general biologic principles, and treated in a scientific way. Unless you do that, there is no hope of realizing our ambition in the solution of the baffling problem of the etiology of malocclusion of the teeth.

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REPORT OF THE EDUCATIONAL COMMITTEE.—OUTLINE OF MATERIAL FOR UNDERGRADUATE INSTRUCTION IN ORTHODONTIA IN DENTAL SCHOOLS

By A. LeRoy Johnson, D.M.D., Boston, Mass.

THE science of orthodontia treats of the growth, development and functional activities of the dental apparatus, and so constitutes an essential element in the undergraduate curriculum of the dental schools.

The study of growth and developmental processes brings together in one concept the different branches of science as anatomy, histology, embryology, physiology, which the student has covered during the first two years of college work and emphasizes the practical significance of the knowledge of each. For example, from anatomy one learns of the external form of the mandible; of the ligamentous and muscle attachments it affords; of the teeth it supports and of the internal architecture of its structure. From physiology, as ordinarily presented, one learns of the mechanics of chemistry of the parts. But in the study of the growth and developmental processes with which orthodontia is primarily concerned one studies the interactions and relations of the different structural elements which make up the dental apparatus; the phenomena expressed in its organization. In bringing together the material of the different sciences and studying the accumulated evidence as a whole one sees the constant change and activity characteristic of living processes in their normal and abnormal aspects. (Such correlation of the material of science is the essence of orthodontia and is basic in dental education.)

JUNIOR LECTURES

The aim of the Junior lectures is to present the laws and principles of science which form the foundation for the interpretation of variations and developmental abnormalities of the dental apparatus. Lectures are also given upon technic laboratory course.

(One has to obtain a knowledge of the fundamental principles of science in order to realize the importance of such knowledge in the everyday practice of orthodontia.)

Historical Survey of Dentistry.

In the earliest records dentistry was considered a part of medicine. Later it drifted away from medicine and became an art of mechanics applied to the restoration of mutilated and missing teeth. This period contributed much to prosthesis, an indispensable branch of modern dentistry. Yet little progress was made in the development of dental science until dentistry was again considered a part of medicine; in other words until

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pure mechanics gave way to biologic evidence and the teeth were recognized and treated as independent parts of the living organism as a whole. The science of orthodontia began with the recognition of the relation of the individual teeth to the growth, development and functional activities of the whole dental apparatus. Roughly speaking this was during the latter part of the nineteenth century.

(A review of the evolution of dentistry helps to make clear its present status and indicates in a degree at least the conditions and probable tendencies of future growth. It also lays the foundation for the definition of the field of orthodontia.

The basic knowledge of dentistry is not so much the cultivation of the art of surgery and mechanical dexterity, which is important and can be acquired by properly qualified students, as it is in acquiring an understanding of the biologic principles which concern the growth, development, function, nutrition, regeneration, and the application of these principles to dental problems.)

Definition of terms and phrases to show the unity of the different phases of biology in the study of form development.

Science. Natural Law. Morphology. Physiology. Psychology. Qualitative and Quantitative Analysis. Growth. Development.

A knowledge of the nature of science in general is a prerequisite to an understanding of any one of its branches. In organic science the basic principle is referred to as natural law. Law means the uniformity of the occurrence of a condition; a consistent recurrence of a condition; a "uniformity seen in the diversity of organic forms."

Morphology and physiology, while being distinct branches of science, must be treated as different aspects of the same thing in order to build a concept of the nature of living structure. Differentiate growth and development.

(A description of the means and methods of obtaining scientific data and of the way it is organized in science with reference to general truths or the operation of general laws is perhaps elementary for the professional schools but unless such knowledge is common to the undergraduate the foundation is always lacking upon which to build the scientific point of view.

The student should be trained to determine the value of evidence as it is presented in the literature. For example, he should see clearly that the results of one or two observations do not establish a general rule, and that all biologic phenomena relative to the dental apparatus cannot be explained by mechanical principles.)

Orthodontia Defined.

The field of knowledge which makes up the science of orthodontia is that relative to the functional activity of the dental arch as a whole, and with the laws which underlie its growth and development; it is that which refers to the functional interaction of the teeth, their supporting and sur-

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rounding structures and the organism as a whole. More briefly it might be referred to as the science which treats of the forces controlling the form of the dental arch. The art is described as that part of dentistry concerned with the treatment of abnormalities of form which interfere with the normal functional activity of the dental apparatus.

(The purpose of modern dentistry is to assist in establishing and maintaining the normal functional activity of the masticatory apparatus of the human organism. Orthodontia is that part of dentistry concerned with deformities which interfere with the normal functional activity of the denture. Dental orthopedia would be better terminology for this branch of dental science as it more truly identifies the nature of the work. In strict sense the orthodontic problem requires that we think in terms of dental orthopedia and realize that we are treating the deformities that interfere with normal function and are not merely aligning irregular teeth.)

Occlusion of the Teeth.

Exposition of the Law of Occlusion.

The basic principle of dentistry, not alone of orthodontia.

The assumption of a form of occlusion peculiar to each species of vertebrates is based upon the following evidence: *First,* the Law of Occlusion; *Second,* the design and plan manifest in tooth-forms; *Third,* the correlation between the type of occlusion, the form of the teeth and the general structural plan of the organism as a whole. As the forms of the teeth and the general plan of structure of the surrounding parts vary in the different groups of animals, in like degree do the occlusal relations vary.

(Review Comparative Dental Anatomy as it impresses the mind of the student of dentistry with the distinctive character, form and relations of the teeth of the different groups of animals. Such study as this gives to the human teeth as regards their forms and relations a significance otherwise unappreciated. Each surface of a tooth in the light of such knowledge has a definite functional value which it is the mission of the dentist to preserve.)

Hypothetical Scheme of Occlusion.

Define hypothesis in its relation to scientific investigation.

The Ideal Scheme of Occlusion.

Being the theoretical relations of the occlusal inclined planes of the cusps of the teeth and tooth surfaces.

(The theoretical relations of tooth surfaces as laid down in the ideal scheme of occlusion is one of the great contributions to dental science. This ideal scheme gives to the dental student a basis for the study of occlusion from which to derive knowledge that is essential in all restorative work. Moreover, it develops the idea that the tooth surfaces, cusps and ridges are the functional units of the dental apparatus.)

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Typical Occlusion.

Anthropology a basis for the study of Individuals.

Type defined as it expresses the extent and direction of individual variations. It defines certain limits of group variation. It is a step in the study of the individual.

(The misinterpretation of this word has been responsible for much superficial work in orthodontia. An exposition of the meaning of type in its literal sense should be given to the undergraduate dental student because it is basic in the concept of the normal. In prosthodontia where artificial representations of type are made practical use of, an idea or type may be falsely created that will seriously handicap an intelligent appreciation of the orthodontic problem.)

The Problem of Orthodontia.

A problem of normal variation.

The question stated is in essence as follows: In what degree can the occlusal relations of the teeth and the form of the dental arch of an individual vary from that which is typical of the race and yet express the conditions most favorable to the growth, development and life processes of the whole individual organism?

(Inasmuch as the orthodontists of the future are the dental students of today, the nature of the field of orthodontia should be defined as clearly as possible to the undergraduates. It should be given to them in its true light, presented as plainly as possible, defining the limits of knowledge relative to the problem in its present state of development. The undergratuate should be made to realize that the diagnosis of deformities involves something more than the recognition of an irregular alignment of the teeth, and that treatment instead of being merely a question of the mechanics of tooth movement is an attempt to influence developmental processes and functional activities which are perverted. Tooth movement is a simple matter; the correction of maxillary deformity is a complex problem.)

Define Normal.

First: as it refers to a standard determined by the constancy; the prevalence; the frequency of the occurrence of a condition in different organisms of a species. A standard of numerical frequency.

Second: as it refers to a functional standard expressing a balance of the functional activity of a part which is best suited to the life adjustments of the organism as a whole. The individual organism is the unit, and the normality of any part, from the standpoint of medicine, is determined by the life processes of the organism as a whole.

Definition of Individual.

(The necessity of a clear idea of the meaning of the word normal is desirable in all branches of medicine and especially so in orthodontia

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where morphological evidence is the principal indication of functional conditions.)

Law of Variation.

Nature.

1. Qualitative.
2. Quantitative.

Manner of Occurrence.

1. Continuous.
2. Discontinuous.

Difference in structure.

1. Size.
2. Shape.
3. Organization.

Difference in growth, development, and functional processes.

1. Physiological Age.
2. Rates of growth.
3. Tooth eruption, etc.

(The course in anatomy treats of the typical forms and relations of structure while the study of the Law of Variation brings out the fact of individual differences which are recognized and vital in the practice of any phase of medicine. Knowledge of differences of structure applies in all surgery and restorative work and in radiography; knowledge of physiological differences in growth and development processes, in pathology and orthopedia. The Law of Variation is a basic principle in the concept of the normal. In order to recognize abnormal tendencies, pathological or developmental, in their incipient stages a knowledge of normal variation is essential.)

Dental Structures in Race History.

Teeth are the primary factors in the evolution of the jaws.

Evidence in Modern man of a process of evolution of dental structures.

General biological principles apply to all living things.

Phenomena of human life not all comparable to lower animals as man is subject to different forces of selection. Occlusion not so vital to existence.

(The object here is to bring out as clearly as possible the value of the teeth in the economy of the whole organism. A correct philosophic viewpoint is the foundation of scientific dentistry, and of course is essential in whatever branch of work the student may elect.

In the extreme specialization of dentistry, so isolated as it has been in the past, unscientific values have been attributed to the teeth. A review of the evolution of dental structures helps to connect the teeth with the rest of the organism, and emphasizes the fact that the value of a tooth is determined by the relation it bears to the functional activities of the whole organism in the adjustment of life.)

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Embryology of the Face and Jaws.

A basis for the interpretations of variations in structure. The form of structure often expresses inhibitions of the natural processes of growth and development, abnormalities being embryonic conditions retained until later life. Conditions which may be normal for one period are often abnormal for another.

Evolution of the individual denture.

Transition of the deciduous to the permanent denture.

(Embryological evidence furnishes a foundation upon which to base a difference in the nature of variations which is essential to rational diagnosis. The deciduous or mixed denture is a growing, developing thing; many variations are steps in the evolution of the mature dental apparatus, and although we employ mechanics in treatment, the problem is ultimately a physiologic one. All variations in the forms of the arch and positions of the teeth are to be interpreted in terms of normal growth processes.)

Heredity.

Review of the Mechanism of Heredity.

Weismann's Theory of the Continuity of the Germ-plasm.

Transmission of Modifications.

Form of structure the result of the interaction of inherent tendencies and environment influences. Heredity determines the possibilities of development; environment stimulates, inhibits, modifies. Environment does not create. Intrinsic factors are the directing force of growth and development. Transmission of Variations. Differentiate transmission and heredity.

Mutilations. Use and disuse. Disease.

(The attempt to attribute all conditions of malocclusion to local mechanical causes is not reasonable in light of the present attitude of science in the question of heredity. It should be clear to all who profess to direct the growth and development of the living organism that heredity fixes the possibilities of growth and development while the probabilities are determined by environmental influences.

The dental student should be familiar with the problem of heredity as presented by the genetist. The "dental point of view" is often narrow and misleading because of opinions based upon observations of private practice or the infirmary clinic.)

Habit.

Tendency to repetition is a normal characteristic of living tissue.

Integrative action of the nervous system.

Development of habit movement.

1. Nature and order of stimulation.
2. Result of action.
3. Inherited Instinctive Tendencies.

Habit movements express conditions of nervous equilibrium in the growing organism.

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(The importance of the care, preservation, and the scientific consideration of the deciduous denture may well be illustrated in the study of Habit and Adaptation as the natural phenomena of development. Carious teeth, premature loss of deciduous teeth, tenderness due to eruption, and irritation due to any abnormality whatsoever, any one or all of these factors in determining the habits of the masticatory apparatus will influence its development. Especially is this true in children of unstable nervous organization.)

Physiology of Dental Structures.

Teeth. Osseous. Muscular. Vascular. Nervous.

Define function as expressing the dynamic processes of living tissues. The action; reaction, and interaction of structural elements in life processes.

Bone.

Review embryology and histology as introductory to the consideration of the physiology of bone.

Significance of connective tissue structures in relation to physiologically more active parts, as muscle and nerve.

Correlation of the internal architecture of long bones with weight bearing function.

Investigations of Macewen and Oppenheim.

The form of bone is determined partly by heredity and partly by the mechanical and chemical influences to which it is subject during growth.

Wolf's Law of bone transformation.

Nature of Alveolar bone supporting the teeth.

Conditions which influence the growth and development of the bone.

Muscle.

Review embryology and histology.

Involuntary smooth; involuntary striped, and striped express a difference in degree of differentiation.

Adaptation due to modification of individual fibers not an increase or diminution of their number.

Physiologically more active structure than bone, hence the latter is plastic to its influence.

Muscle: nervous and vascular structures are physiologically interdependent.

Classification of Dental Structures.

Non-functional—Teeth.

Form of the teeth not dependent upon the stimulus of the function of mastication.

Transitional—Muscle, nerves and blood vessels and bone in general are dependent upon both heredity and function for development.

Functional—Alveolar bone is a truly functional structure as the teeth are non-functional.

These structures are assembled in anticipation of the function of mastication to organize and mold into a harmonious whole.

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Principle of Harmonious Development.

History of the Principle. Cuvier.

Practical application of the principle in Paleontology.

Harmonious development involves the consideration of *first*, evolutionary tendencies; *second*, Mendelian characters; *third*, the fundamental unity of the organism as a whole.

Evolutionary tendencies.

Law of economy of growth.

Conditions not all comparable with the lower animals as man is subject to different forces of selection.

Mendelian character is a unit character.

Is the organism a mosaic of hereditary characters?

Organic unity.

Function of the nervous system; the blood stream; the internal secretions.

Can it be assumed that under normal conditions the individual organism will invariably evolve into an harmonious whole?

(The argument should be presented to the student that he may appreciate something of the complexity of the problem malocclusion and disharmonious development.)

Malpositions of the Teeth.

Classification of Malocclusion.

SENIOR YEAR

Demonstrations of cases under treatment by competent instructors. Selection of representative cases.

Construction of appliances upon manikin heads, and the theory of their manipulation.

Lectures: The Classification of Facial Deformities.
The Musculature of the Face and Jaws.
The Influence of Diet upon Development.
Correlative Variation.
Physiologic Tooth Movement.
Supernumerary and Missing Teeth.
Mutilation.
Anomalies in Development.

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ORTHODONTIA COMMITTEE ON EDUCATION—REPORT ON TECHNIC TEACHING IN THE UNDERGRADUATE SCHOOL

By Herbert A. Pullen, D.D.S., Buffalo, N. Y.

THE Committee on Education felt that its report would not be complete without suggesting some scheme in undergraduate schools for teaching technic which would not be so distinctly *orthodontic* as to be of little value to the student who wishes to practice *general dentistry only.*

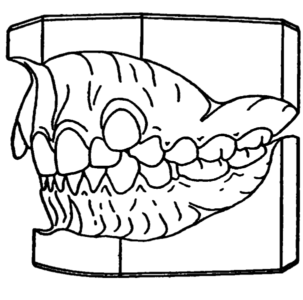
Hence a consideration of the *fundamentals* in a *technic* which would be of value to the dentist in increasing his *manual dexterity* and *visual accuracy* seemed essential.

To this end, old methods of making *threads and nuts,* drawing wire, etc., which really belong to the manufacturer of appliances, are *discarded* as of little or no value in developing *usable manual dexterity.*

The orthodontic technic which can be taught might be classified as follows:

1. Plaster technic—distinctly orthodontic in its perfection.
2. Soft soldering technic—not distinctly orthodontic—but not taught to any degree in dentistry.
3. Hard soldering by hand—distinctly orthodontic.
4. Wire bending—with *flat* and round nose pliers.
5. Construction of incisor, cuspid, bicuspid and molar *plain* bands on prepared *artificial stone* or *metal* casts.
6. Construction of simple $\left\{\begin{array}{l}\text{labial}\\ \text{lingual}\end{array}\right.$ appliances on artificial stone casts.
7. Operative technic on manikin head.

ORTHODONTIA TECHNIC—JUNIOR CLASS SCHEDULE



PLASTER IMPRESSIONS AND CASTS

1. **HYGIENIC AND PROPHYLACTIC STEPS.**
   a. Cleanliness of the hands.
   b. Clean office coat and towels.
   c. Sterilized instruments.

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2. **PREPARATION OF PATIENT.**
   a. Patient seated upright.
   b. Chin level with operator's *elbow* for upper impression.
   c. Chin level with operator's *shoulder* for lower impression.
   d. Prophylaxis of patient's mouth before taking impression.

3. **TAKING THE IMPRESSION (Upper and Lower).**
   a. Selection and trial of impression tray in mouth.
   b. Mixing of the impression plaster.
   c. Distribution of plaster in impression tray.
   d. Filling buccal and labial spaces with plaster.
   e. Insertion of filled impression tray in the mouth.
   f. Removal of surplus plaster from sides and end of tray.
   g. Removal of tray.
   h. Grooving of impression.
   i. Fracturing and removal of impression in labial, buccal and lingual sections.

4. **LABORATORY TECHNIC IN PRODUCING CASTS.**
   a. Drying, assembling and beading impressions.
   b. Application of color and separating mediums.
   c. Mixing cast plaster and pouring the casts, using camel's hair brush.
   d. Inversion of filled impression on glass slab.
   e. Sectioning impression shell to color medium horizontally and vertically.
   f. Removal of sections in order—buccal, lingual and labial.
   g. Burnishing of section lines and repairing defects on anatomical portion of casts.

5. **TRIMMING OF CASTS BY ACCURATE METHODS.**
   a. Leveling lower cast with knife and plane.
   b. Use of triangle chart for outlining standard patterns.
   c. Drawing of pattern on base and capital (lower and upper casts).
   d. Trimming casts to prescribed patterns.
   e. Occluding upper cast to lower and leveling plane of capital.
   f. Back of both casts in same vertical plane.
   g. Vertical planes on all sides of base and capital.
   h. Rounded front on lower cast and angular point on upper cast.
   i. Beveling of surface angles of base and capital.
   j. Numbering of finished model on front of lower and back of upper cast.

6. **COPY DRAWING OF OCCLUDED CASTS ON DRAWING PAPER.**
   Name...
   Accepted...

Fig. 1.—Schedule Plaster Technic

The technic work should be confined to the Junior and Senior Classes, and should be preferably taught by a *Schedule* system arranged with detailed steps of procedure, each step being accepted and marked when finished by the demonstrator. An illustration of the schedule for the plaster technic is shown in Fig. 1.

The *Schedules* should be self-explanatory as far as possible and each piece of technic should be illustrated on the schedule card according to scale measurement to secure uniformity and accuracy.

The object of the technic work should be not to make orthodontic specialists but to train the student in *manual dexterity* and *visual accuracy* along lines

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that will be of as much value to him in dentistry as in operative orthodontia should he elect to specialize.

JUNIOR TECHNIC

Schedule A—*Plaster technic.* Step method of teaching. Drawing completed casts in occlusion after zinc etching. (Fig. 1.)

Schedule B—*Soft solder technic.* Solder pieces of wire solder together in form of circle, hexagon and square. *Draw pattern.* Sample of hexagon shown in Fig. 2.

Schedule C—Soft soldering circle, triangle and hexagon with internal cross members. Draw pattern. Sample of triangle shown in Fig. 3.

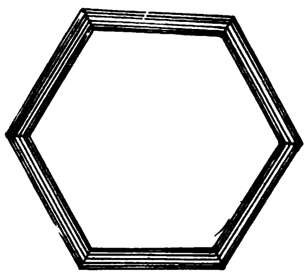

Fig. 2.—Sample of one of the forms of Schedule B. External diameter 2 inches.

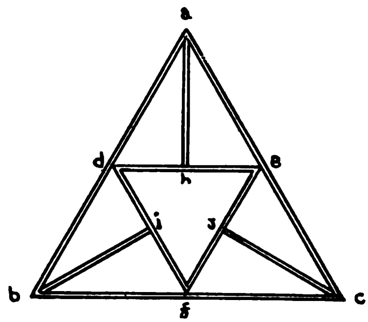

Fig. 3.—Sample of one of the forms of Schedule C.

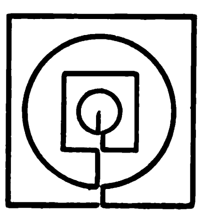

Fig. 4.—Sample of one of the forms of Schedule D.

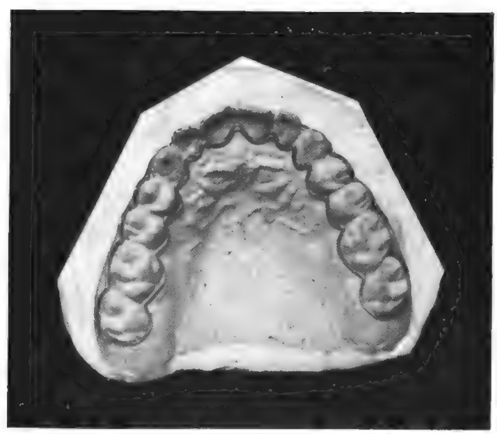

Fig. 5.—Schedule.

Schedule D—*Flat and round nose pliers* used in bending wire into various geometrical forms. Draw pattern. Sample of circles and squares shown in Fig. 4.

SENIOR TECHNIC

Schedule E—Incisor Band technic. Molar Band technic with hard solder unions.

Schedule F—Fitting *single piece* of wire entirely around dental arch following gingivae buccally and lingually and uniting at end as shown in Fig. 5.

Schedule G—The construction of simple appliances on casts or manikin.

Operative Clinic—Conducted by demonstrator only.

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PARTIAL ARTIFICIAL DENTURES IN CASES OF MISSING DECIDUOUS TEETH*

By Carl O. Engstrom, D.D.S., Sacramento, Calif.

AT our session a year ago I showed to some of the members of this Society the plaster casts of a little girl seven years of age who was missing her mandibular deciduous molars. As I promised at that time, I will again present the case, explain the treatment and the results. In introducing the principle of the use of artificial teeth in cases of loss in masticatory function caused by the absence of deciduous teeth, I will show another case which is of a kind not so unusual in practice. In view of the present contentions relative to focal infection and infections in general, this means of restoration

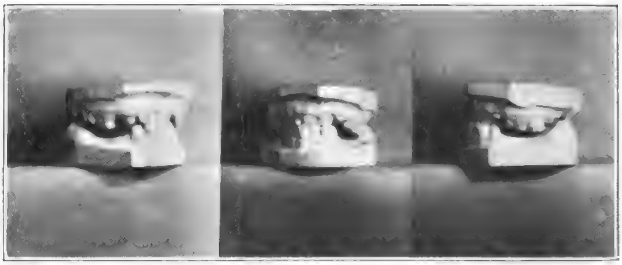

Fig. 1.

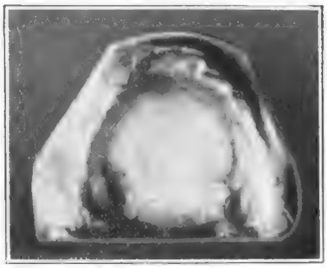

Fig. 2.

may be deserving of your serious consideration. Besides pathologic consequences, loss in masticatory function due to the absence or premature loss of deciduous teeth is of considerable significance in proper development; coincident, as it happens, with a stage in life upon which rests in no small degree the future welfare of the individual. The loss of function occurring in cases of malposed teeth is no greater a factor in fundamental growth than is the absence or premature loss of deciduous teeth. The value and the use of artificial dentures for children rests with the orthodontist who is well equipped with orthodontic knowledge.

*Clinic before the Pacific Coast Society of Orthodontists, Portland, Oregon, Feb. 16, 1921.

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The first case is that of a girl seven years of age. You will note by the casts (Figs. 1 and 2) that the mandibular left canine is the only deciduous tooth shown in the mandible, and that all molars are missing. However you will note the presence of permanent mandibular incisor teeth. You will note the maldevelopment of the maxilla, and the relative position of the anterior teeth. The radiogram showed the presence of premolars and molars widely

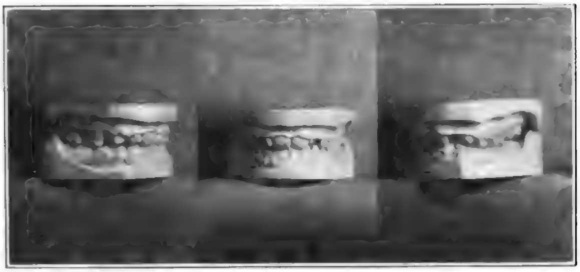

Fig. 3.

Fig. 4.

separated in the elongated mandible. Some of the missing teeth had been extracted about a year previous, others before that time. The girl suffered considerably from digestive disorders and cutaneous eruptions. These cutaneous eruptions, as I was told by the mother, were prevalent the entire year, and at times her body was almost completely covered with hives. Her nervous system was badly affected.

The general conditions prevailing in consequence of this loss in mastica-

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tory function were indicative of probable serious affliction, and some restoration of the masticatory function was imperative. Therefore a partial vulcanite denture was constructed to replace the missing teeth. The anterior teeth were caused to assume positions for proper function. The casts (Fig. 3) made from a bite impression show the plate in place and the changed relative positions of the anterior teeth.

The result was a return to normal digestive function and a lessening of skin eruptions: the nervous system also improved considerably. The photographs (Fig. 4) tell their own story. Note the expression of the thin lips, similar to that of the edentulous adult. The picture on the lower right, taken during the act of smiling, shows the lips had not up to this time changed to fully conform to the altered dental apparatus.

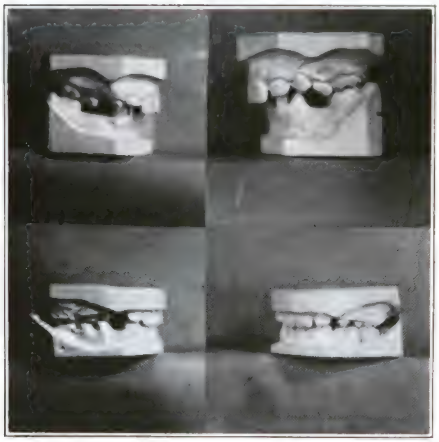

Fig. 5.

I will show you another case (Fig. 5), in which I used a partial vulcanit denture in the treatment of malocclusion as well as in restoring the masti catory function, loss of which was due to extraction of the deciduous molars The photographs of the casts are self-explanatory. In the treatment of thi case orthodontic appliances were used to cause the mandibular teeth to assum more normal positions and thereby allow for the reception of properly size artificial deciduous molars.

A fundamental principle in treatment such as presented is that, at thi stage in development, the supporting tissues of the first permanent molar should not be hindered in their physiologic growth any more than absolutel necessary by an orthodontic appliance used in the movement of teeth. Fror the time that the cusps of the first molars make their appearance to the tim these teeth come into full function by contact with those of the opposing jaw the alveolar process and contiguous parts are passing through a most impor tant stage of development resulting in the attainment of the predestined pur pose, the transmission of the normal force in mastication and the support o the bite. Thus is influenced vertical development during the stage of th shedding of the deciduous molars and the eruption to full function of th premolars.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

POSSIBILITIES IN AN ORGANIZATION OF ORAL DIAGNOSTICIANS*

By Clarence O. Simpson, M.D., D.D.S., St. Louis

THE title of this paper was chosen after a review of the published list of men responsible for the preliminary organization of the Society. Since the list of members includes practitioners of general dentistry, oral surgery, exodontia, orthodontia, and periodontia, the only common interest from a radiographic aspect, is oral diagnosis. Therefore, it seems more appropriate, and consistent with the personnel, to refer to this as a society of oral diagnosticians.

The selection of the name American Society of Dental Radiographers, appears unfortunate, and in view of the present membership, a deceptive misnomer. Authorities define a radiographer as, one who makes negatives by the use of x-rays, and when qualified by "dental," it may be defined as one who makes negatives pertaining to the teeth. This classification would include unlicensed assistants, mechanics in commercial laboratories, and demonstrators of x-ray equipment, which evidently was not the intention since graduation from college was the only qualification suggested in the advertisement for members.

Further inconsistency is presented by the list of members being composed of men who do make negatives for their patients by the use of x-rays, men who employ a girl to make negatives, men who sell negatives at a specified price, and men who do not own radiographic equipment. However, negatives made by the use of x-rays is conceded the most important factor in oral diagnosis, so there is a compatible classification for all these men under the term "diagnosticians," and a fertile field for associated endeavor. The use of "oral diagnosticians" is prompted by a regard for propriety, and not with the idea of having it adopted by the Society. The world abounds in misnomers, even when those most interested participate in the christening, so

*Read before the American Society of Dental Radiographers, at Chicago, January 18, 1922.

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this Society will probably continue its existence with general speculation as to who is eligible, who belongs, and—why?

There are established societies of orthodontists, periodontists, exodontists, and prosthodontists, with membership confined to those who have limited their practice to the particular field for a specified time. The members of these societies subscribe to a high standard of ethics and proficiency, and are applying intensive study to the solution of scientific problems. Unquestionably, the importance and present status of radiodontia offers equal opportunity for organized effort. Although there are several competent men limiting their practice to radiodontia and devoting their lives to the advancement of the science, who did not have the privilege of representation in the formation of this Society: the popular conception of radiodontia accords it about the same degree of significance as "snap-shot" photography. Like photography, it is depreciated by the fact that any one can mechanically "take a picture" and continue to live in blissful ignorance of the artistic and scientific laws violated. An epigrammatist in discussing the principles of artistic composition said, "Two men are required to paint a picture, one to paint, and the other to kill him when the picture is finished." This might be transposed to apply with evolutionary advantage to radiographers, by having someone to kill them when they make a "picture," and stop without getting the information obtainable.

Matters of special interest to radiodontists are the perfecting of a systematic technic, increasing the refinement of interpretation, the collection of authentic data on physiologic variations and pathological changes in oral structures, the adoption of uniform methods in case histories and reports, the disposition of radiographic records, the training of assistants in their legitimate functions, the devising of equipment and accessories for greater efficiency, the education of dentists in the indications for, and application of radiodontic examinations, and establishing the proper professional rank of radiodontia. Men who do not limit their practice to radiodontia are not vitally interested in these specific problems, or they would have utilized more of the fundamental principles of radiodontic practice suggested in textbooks and periodical literature. Although they may profess to practice radiodontia in connection with other specialties, or general dentistry, their chief concern in radiography is getting passable radiograms with the least trouble and greatest profit to themselves. Engrossed in operations of entirely different character, the radiogram is a mere adjunct as it pertains to diagnosis, operative procedure, and postoperative results, with little consideration being given to the comparative excellence. Admitting they do desire improvement, especially facility in radiography, they are content to wait until others accomplish it. However, the study of diagnostic and operative methods does appeal to the conscientious radiodontist, for he must consider them in his examinations and reports, and in proportion to his knowledge of the optional treatment, can he be of service in the examination.

If this preamble conveys the ideas intended, it becomes evident that a society of oral diagnosticians may be composed of men seeking information

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about dentition, malocclusion, caries, pulp complications, periodontal lesions, and pathological alveolar involvement, in all of which radiography is essential. Correct diagnosis is credited with being the most important factor in the successful practice of medicine; is it any less important in the successful practice of dentistry? In the study of diagnosis, there is a distinct advantage in the collaboration of men from different branches of practice. Probably all of you have had the experience of obtaining valuable information in perplexing cases, from the viewpoint of someone in another branch of practice, or even another vocation.

Assuming that this organization of oral diagnosticians, through a common interest in radiography, will continue to exist under the name of Dental Radiographers, there are some principles of service, ethics, and dignity, which it should foster. With the avowed purpose in a published statement, of advancing dental radiography as a science and specialty, there are obvious recommendations which should be incorporated in the constitution and by-laws of this Society. Not in the form of debatable generalities, but in a concise, unmistakably worded code regulating the ethical phases of the practice. Sporadic criticism, and appeals to professional ideals have not, and will not prevent incompetent exploitation, or commercial abuses in radiography. Laws do not stop crime, but they reduce it by defining the limits wherein the disregard for the rights of others becomes a public menace, and by prescribing penalties for those who offend. The regulations of this Society will not eradicate the prevailing abuses, but they will serve as a definite guide for all who desire to conduct themselves decorously, influence opinion regarding honest service, provide a basis for legislation, and through eligibility to membership, will distinguish the commendable from the unworthy. A prominent member of the National Association of Dental Examiners, has publicly stated that the Association would have laws enacted to regulate the practice of radiodontia, when they had an authoritative standard.

Doubtless, many will concur with most of the recommendations offered, but object to those which interfere with their convenience, or questionable source of income. However, it is not a matter to be decided by individual preference, but by that which is essential to improve the character of radiodontic service, maintain the dignity and prestige of the dental profession, and elevate the professional standard of radiodontic practice. It is believed that the following suggestions are obviously for the welfare of the public, and the profession in general.

(1) Only a licensed dentist or physician is legally qualified to make a radiodontic examination. Because the laws of all states require a license from the State Board of Dental Examiners to practice dentistry, with limited exceptions for licensed physicians, and the manipulation of a patient for the purpose of diagnosis or treatment constitutes the practice of dentistry in the meaning of the term. Because the insertion of foreign materials in the mouth, subjection of the patient to the dangers of high voltage electric current and destructive radiation, and obtaining diagnostic data entails a greater risk than the average dental operation.

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(2) A dentist who permits an unlicensed assistant to make a radiodontic examination is an accessory to a violation of the law and does not fulfil his obligations to the patient. Because a dentist is legally responsible for the acts of his employees in operations upon patients in his office. Because a person not qualified to practice dentistry is not legally qualified to make a radiodontic examination. If conditions prevent the dentist from making the examinations and he wishes to give this service, he should employ a dental graduate instead of capitalizing cheap labor.

(3) The practice of radiodontia should be conducted under the name, or names of the operators making the examinations. Because the laws of most states prohibit the practice of dentistry under any name except that of licensed dentists. Because it places the responsibility of practice upon licensed operators. Many x-ray laboratories are incorporated for the purpose of evading malpractice litigation and to give immunity to the individuals.

(4) It is unprofessional to give or offer commissions for patients referred, to solicit practice, or to influence the reference of patients by gifts. Because it is dishonest to exact a fee in excess of the valuation of the service by the operator for the purpose of bribing confederates. Because gifts of viewing devices, desk ornaments, etc., are merely a cheap method of soliciting practice and a breach of professional conduct.

(5) It is unprofessional to display signs or insert a statement in any publication, announcing the specialty practiced or the use of x-rays in dentistry. Because signs or public announcement of special practice or methods are intended to attract patients, and a fundamental of professional ethics is the treatment of only such patients as apply to the practitioner. Because the announcement of x-ray service in dental practice is a claim of methods presumably superior to neighboring practitioners. There is no ethical distinction between the signs, "Diseases of Men," "Extraction of Teeth," and "Dental X-Ray." The latter is the most objectionable of the three, because it has no meaning. From an ethical aspect there is no difference between advertising by signs, "Piles Cured Without the Knife," "Painless Dentistry," "Teeth Filled by the Aid of the X-Ray," and "Dentist, and Dental Roentgenologist." The fellow who advertises to cure piles without the use of a knife may use button-hole scissors, and the dentist who advertises x-ray dentistry may use it to impress the patient but not to prove the efficiency of the operation after it is performed.

(6) Basing the fee for radiodontic examinations on the number of films promotes inadequate service and is an unprofessional procedure. Because it places a monetary restriction upon the thoroughness of an operation, the undertaking of which obligates the operator to perform to the best of his ability. Because it lowers a professional service to the plane of a commercial transaction and is designed to deceive the public.

(7) It is unprofessional to advertize fees, special methods, or extraordinary skill to the profession or public. Because patients are not expected to judge the relative value of professional service, and advertisement of fees is intended to attract practice by underbidding. Because competitive advertizing is undignified and destructive to professional ideals.

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(8) It is the duty of all practitioners of radiodontia to retain radiographic records of all cases examined. Because, possession of the radiographic records is a protection to the patient, the conscientious dentist, and the competent physician.

Example A. A dentist attempts a canal operation in a strategically important tooth previously treated, and during the treatment announces a perforation or fracture of the root. The radiographic records are lost, and the patient wonders which dentist erred. The shyster lawyer only inquires which dentist has financial resources and an enviable reputation.

Example B. A physician finds serious symptoms of focal infection and has a radiodontic examination made. Teeth are removed upon his advice, and the patient magically recovers—or dies. The family dentist states there was no evidence of oral sepsis, and the radiographic records are lost.

Too little importance is attached to radiodontic records, most doctors are careless in their filing system, and patients are inclined to consider radiograms as a momentary curiosity. The radiodontist has frequent requests to loan duplicate films after the originals are lost, the patient changes dentists, or someone wants to see the records without consulting the custodian. If the radiodontist submits to this imposition, and attempts to keep his files intact, he encounters many annoyances. It entails a memorandum of the circumstances, usually a reminder to the doctor to return the films, and often the ultimate loss of the records. Dentists should insist upon retaining the radiographic records of their cases to observe results, and for his protection.

(9) Dentists who do not make routine use of radiographic examinations, and fully cooperate with physicians in the eradication of oral sepsis, are not fulfilling their obligations to the patient. Because there is abundant evidence of serious results from dental operations performed without the essential radiographic information. Because dentists are prone to utilize x-ray examinations only in emergencies and oppose physicians in the investigation of oral sepsis. Some dentists are still devotees of the ancient sport of digging holes, and filling them, without regard for general oral conditions or the health of the patient.

These suggestions are offered, not with the motive of destructive criticism, or to impose personal opinion upon the policies of this Society, but from a sincere desire to advance the practice of radiodontia, and increase its benefit to humanity.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

A "Full Mouth," but Room for Improvement

Q.—Having heard of your using sixteen films in radiographing the teeth I want to ask why so many are supposed to be needed. I call ten films a ful mouth, and seldom have to take more.

A.—Congratulations, Brother, you are contented, and contentment is a munificent blessing. You are also to be envied for your confidence in making a radiographic examination of all the teeth on ten films, and having few failures.

Since there is a possibility of your faith in the omnipotence of a ten-film panorama being shaken when you become more discriminating, and because the question has an important bearing on radiodontic service, the advantages of a more thorough examination will be described. Your expression "ful mouth" is highly descriptive, for the result of an attempt to radiograph al of the teeth on ten films usually suggests a mouth full of teeth, in extreme malposition. The plan of limiting the examination to ten films, necessitates getting the desired information from a single view of three or more teeth Many important diagnostic points are obscured in attempting to get a satis factory view of such large groups. The lamina dura may not be visible around all of the teeth, the appearance of the roots is misleading, proximal caries and deposits are hidden, and bone involvement may not be seen. Usually only one aspect of each tooth is shown, and there is no corroboration of evidence which is imperative for reliable interpretation.

The systematic division of the dental arches into sixteen areas excludes the usual confusing anatomical structures and gives two or more views of each tooth, excepting the third molars and the mandibular central incisors. The third molars are often absent, and the mandibular incisors are rarely a source of disturbance. Three views of the maxillary incisors are shown to eliminate the superimposed nasal shadows, the anterior palatine canal, and the distortion resulting from the curve of the arch. One film is allotted to each of the canines, because they are longer than the other teeth and occupy positions at the angles or sharp curves of the arch. However, in getting the canines eccentric views of the lateral incisors and premolars are shown, both buccal and lingual roots of the maxillary first premolars are exhibited, and the mental foramina are located. The true lingual aspect of the premolars are shown

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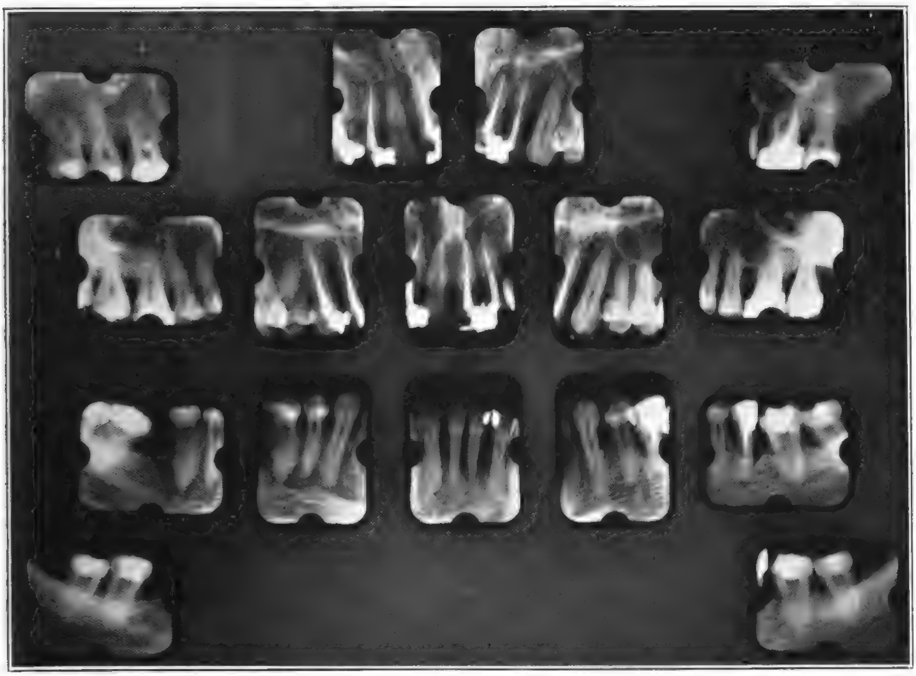
with the first molars, without regard for the second and third molars. This view usually discloses the lingual and disto-buccal roots of the first molar, with the proximal surfaces of the premolars and first molars. The second and third molars are paired for examination because their mesio-distal axes are nearly parallel, and the shadow of the malar process is usually cast anteriorly to the maxillary second molar in the exact lingual view of this tooth. This area also displays the mesio-buccal root of the maxillary first molar, and both canals in the mandibular first molar.

The radiography of the sixteen areas described should be termed a general radiodontic examination, and does not signify that only sixteen films are



An illustration of a systematic general radiodontic examination of sixteen views.

used. Anatomical difficulties and technical errors will demand repeated exposures of some areas to obtain uniform results. A radiodontic examination should not be limited to a specified number of films or the fee based on the number of films. A general radiodontic examination should exclude anatomical perplexities; disclose periapical involvement, proximal caries, marginal disturbance, and abnormalities. If you apply this lax test to your "ten-film full mouth," you will find it does not approximate a radiodontic examination, although some pompous institutions and pseudospecialists are pot-shooting these "full mouths" and fraudulently disposing of them under the pretense of a diagnosis. A general examination is not necessarily complete in that many conditions require extraoral plates, exploratory probes, or some method of localization; while for canal operations or surgical procedure an exhaustive x-ray examination of an area may be indicated. If this answers

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your question of why so many films are supposed to be needed, reflect upon it, and decide whether you have been giving your patients adequate service or merely selling films at an exorbitant price.

Fools, Differing Only in Degree

Q.—The family physician has advised one of my patients to have her crowned teeth, eight in number, extracted. I refused to do it, because none of them give trouble. Who is right?

A.—You have raised a question which opens the relationship of the medical and dental professions, and suggests a volume instead of the pages to which this dollar-a-word department is limited. As the question is stated neither of you is right, and may a guardian angel mercifully lead the patient to some one who will exercise more intelligence. Diogenes, page Dr. Ray Diodontist. Since the physician condemned all of, and only, the crowned teeth, he probably based his decision on a smattering of oral sepsis instead of reliable evidence. After one of the medical profession (Dr. Hunter) made a gas attack on crowns, physicians are inclined to believe all crowns are a menace. A little knowledge about a thing is likely to lead to extremes. Most physicians do not know that when dental colleges were teaching it was mal practice to crown vital teeth, there were many malpractitioners doing it. Now the dental colleges are teaching vitality of pulps, but there is still a steady sale for barbed broaches. In advising the experimental removal of eight teeth (one-fourth of the dental quota, and perhaps three-fourths of the masticatory function), the physician outradicalized the biological Bolshevik of dentistry; but he should be given credit for gameness in staking his opinion against the patient's teeth. When the advocates of the surgical removal of teeth break into medical literature, perhaps physicians will advise blasting out the crowned teeth.

You are only in the other end of the boat rocking it the same "one-born-a-minute" manner. If you had kept in touch with dental pathology, you would know that chronic infections rarely cause local symptoms. In the dark ages, before the advent of radiography, dentists believed alveolar abscess was cured when the local symptoms subsided, but the fallacy of this has been conclusively proved. No one but God and Dr. Thomas Hinman, who claims to locate 95 per cent of granulomata without the x-ray, knows whether or not the crowned teeth are "giving trouble." You and many other dentists must revise your diagnostic technic, and begin by eliminating the "giving trouble" element from your conclusions. All supporting bone around teeth is destroyed by pyorrhea alveolaris without "giving trouble;" cysts an inch in diameter, develop in jaws without "giving trouble;" and lungs are destroyed by tuberculosis without "giving trouble" by local symptoms. The "giving trouble" diagnosis has been relegated to the discard, along with the "catching cold" alibi for dental infection, and the "salivation" etiology of pyorrhea alveolaris. Radiography provides a means of accurately determining conditions around teeth, and before extracting or refusing to extract teeth you should thoroughly investigate conditions. Furthermore, by periodic x-ray and clinical examinations you should promote the oral health of the

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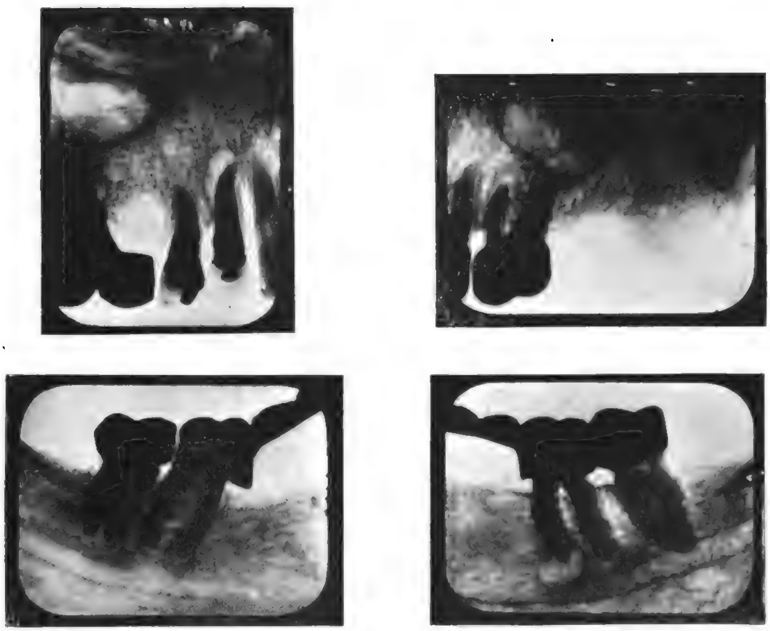
patients who intrust themselves to your care, without being requested by the family physician. In many instances physicians have advised the removal of teeth because they could not get cooperation from dentists. When a physician refers a patient for the investigation of oral conditions, and the dentist reports that he has cleaned the teeth and found no cavities or none of the teeth seem to be giving trouble, the physician is compelled to act independently for the welfare of the patient. Some physicians display excellent judgment in dental matters, but others exhibit the veterinary standards of your colleague.

An oculist who suspected focal infection as an important factor in a rapidly failing vision advised a radiodontic examination. When the patient asked the dentist, who had recently placed two bridges in the mouth, about



Radiodontic records of a patient with rapidly failing sight. The dentist protested against the examination because the teeth were not "giving trouble."

it, he said "Your teeth are all right, it is foolish for you to have them x-rayed on account of your eyes." The radiodontic examination was made over the dentist's protest and disclosed the evidence of septic dentistry illustrated by the accompanying radiograms.

Such experiences are not unusual, and so long as they occur physicians cannot be censured for independent action. When dentists perform their operations in conformity to accepted standards, keep subsequent developments under observation, and cooperate with physicians in excluding oral sepsis, there will be little friction between the professions. Dentistry offers a wonderful opportunity for service when full advantage is taken of its possibilities, but contemptuous reference to its mechanical limitations has had some justification in the preponderance of "journeymen" dentists lacking in professional conception.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Value of the Animal Experimental Method in Dental Research. Mrs. Mellanby (Liverpool). The Dental Record, January 2, 1922, xlii, 1.

Some of the paradoxic conditions which obtain in our knowledge of the teeth are contrasted by the writer. It may be the person with the clean mouth who suffers from extensive caries, while the dirty mouthed subject may have sound teeth. Certain dark races violate all the laws of dental hygiene and yet have perfect teeth; those who eat soft and pappy food may have better teeth than those who habitually masticate. It is evident that these mysteries cannot be solved save through experiment. According to the laws of heredity those who have good teeth should transmit them to their posterity, but this is not always the case. The claim that caries is a white man's disease only is antagonized by the statement that a negro or Esquimaux suffers from this affection if he lives as a white man. In New York some of the negroes have teeth as carious as those of the nearby white. In studying the factor of hygiene as distinct from diet—bad housing, poor ventilation, lack of exercise for months—this does not induce caries in the Esquimaux or white natives of the Western Hebrides, and, as pointed out above, diet alone cannot determine caries with certainty. It is possible in theory but not in practice to experiment on mankind but it would mean a restricted diet for months and expensive studies of metabolism. The rapidly maturing and ageing dog is far better adapted to experiment and can be dieted on exclusive food articles without hardship. The writer, whose husband has made well known studies on animal rachitis, was in position to use his material and conducted experiments on about 300 puppies. Diets were selected largely by vitamine content and studies were made on the histology of the teeth in dieted and other animals. The writer has made the discovery that a diet however abundant, balanced and assimilable, but without the fat soluble vitamine, is followed by imperfect calcification of the jaw bones and alveolar processes, which in turn results in imperfect alignment of the teeth, especially the lower incisors. There is further a delay in the eruption of the temporary teeth and a slower evolution of the permanent. Again there is delay in calcification and defective enamel with relatively small amount of dentine. An indirect result of deficiency in fat-

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soluble vitamine is lowered resistance to disease. Foods which guarantee the needed vitamine comprise cod liver oil and most animal fats excepting lard, whole milk and cheese made from the same, and butter. Green foods of course as the original source of vitamine abound in the latter and also in calcium, but could not be tested on puppies. The older diets recommended by dentists of the previtamine period were, singularly, lacking in most of the articles enumerated above, although they contained raw fruits and the raw salad vegetables.

Fracture of the Mandible at the Seat of a Bone Phlegmon of Dental Origin. Nogue et Bibard. La Revue de Stomatologie, September, 1921, xxiii, 9.

The patient was 45 years old and consulted the authors for 6-year molar trouble to the right. This was found to have caries with necrotic pulp. The cavity received a temporary filling with cement and when seen three days later the tooth was found loose with an osteoperiotitic tumefaction of the gum; it had not ceased to ache since the filling. Extraction was at once performed without an anesthetic. Seen again four days later patient reported that pain had never ceased. The adjacent bicuspid was extracted, as it was carious, and came away readily. The osteoperiostitis continued its evolution unchanged and a collection of pus in the submaxillary region resulted and was evacuated. Pus could be squeezed from the alveoli and the curette was used. On the day following the curettage the patient noted that his lower jaw was unduly mobile and it was found that a complete fracture had occurred at the level of the 6-year molar. The existence of sequestra was assumed which would naturally interfere with union if the fracture were set. After an x-ray had been taken the curette was used under general narcosis and a number of sequestra, one as large as a hazel nut, were brought away. The mandible was now immobilized and resolution took place with the exception of a small external fistula. No constitutional condition was found to account for the fracture. This accident is a very infrequent complication of odontogenic phlegmon of the mandible. Some of the larger reference works do not mention it. It would be termed a quasi-spontaneous fracture, for while there was no typical external violence to explain it, such a possibility could not be wholly excluded. Perhaps it was as nearly spontaneous as any fracture can be. The process of sequestration did not involve the width of the mandible, although the underlying inflammatory condition may have made the bone so friable that muscular action sufficed to break it.

Novocain Dermatitis in Dentists. C. Guy Lane (Boston). The Dental Cosmos. September, 1921, lxiii, 9.

The author is a dermatologist connected with the Massachusetts General Hospital. In certain predisposed individuals an eruption after due exposure to novocain begins on the hands, at times between the fingers, characterized at first by slight redness, with itching or burning. While the entire hand may be involved the dorsal surface is the area of preference. The redness may be

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succeeded by crops of vesicles which may be partly the result of scratching. Later manifestations are crust formation, fissures and involvement of the nails. This dermatosis comes under the head of an occupation disease—a dermatitis or eczema of occupational origin. That the condition comes about through local contact and not from absorption appears from the fact that it disappears upon removal of the irritating cause and that one may work with rubber gloves with impunity. The author narrates two severe cases in which novocain was found to be the offending substance, out of a number which the patient handled. In the severe case the dentist becomes unable to work and on laying off, the condition vanishes without the use of special skin alteratives. It is readily shown that the first appearance of the eruption is the point of contact with the novocain solution, but in the extension of the dermatitis some other factor must be responsible. One thinks in this connection of a possible parasite, or of a process of sensitization of the skin of the hand. No parasite has been isolated and if the unknown factor were anaphylaxis there ought to be a general reaction as well as local. Delay in the development of the lesions after exposure is evident and this fact speaks against anaphylaxis. Again not one dentist with the dermatitis had ever had novocain used on himself.

Contacts with the novocain solution occur in a variety of ways—from the barrel of the syringe, from the needle, from the patient's mouth. Comparison of the novocain dermatitis with similar affections does not aid in the solution of the problem. Other local analgesics have behaved in a similar manner, but only to a slight degree. Occupation dermatitis does not show much type and in each case the condition is autonomous to a large extent. Urotropin *per se* causes rash on handling, but in the process of vulcanization it appears to set up a dermatitis of occupation. Close study appears to show that this eruption is due to the incidental formation of formic acid. But novocain cannot be shown to form any other irritating derivative, for it is naturally stable and there is nothing to render it unstable in its dental use. The author naturally tested the skins of his patients intradermically for the presence of novocain intolerance and in all cases obtained the local reaction—once in a few minutes but otherwise the reaction would be classed as delayed. Under the head of treatment nothing further can be said. The only cure is to keep the skin protected and this is also, of course, the prevention as well. The percentage of dentists to develop novocain dermatitis is very small. It would appear to the reviewer that scratching is the factor responsible for the extension of the disease over the hand, as according to the author, the puritus may be intense. We find no statment as to whether the diffusion is equally present if itching is not a conspicuous phenomenon.

A Consideration of Impactions. R. P. McGee (Pittsburgh). The Dental Cosmos, December, 1921, lxiii, 12.

The subject of the eruption of the teeth is not yet fully understood. An impaction is a condition in which eruption of the tooth is hindered; it may be temporary or permanent and may also be incomplete. There may be a traumatic cause and the mandible is more exposed to traumatism than any other

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bone in the body, although the clavicle is often put before it in this respect. A mere blow on the lower jaw is known to have interfered with its development. Fevers may also interfere with calcification, as may unusual anomalies of dentition. Disturbance of calcification may consist in irregularity of deposit which favors impaction. Again a condensing osteitis is set up about any devitalized tooth. This has been demonstrated by measuring the elasticity of living and dead teeth. Indurations of the maxillæ come from a variety of causes: injury, fever, etc., often the causation is obscure.

It is the impacted cuspid rather than the impacted third molar which is the more frequent cause of nerve reflexes. A case is cited of a cuspid tooth impacted in the center of the roof of the mouth; the subject had been insane for four years when the accidental x-ray discovery led to an operation, which was the means of restoring him to his former business activities.

So much error has crept into the fundamentals of dentistry that it is often more profitable to go back a hundred years than ten years. The author here cites the remarkable prescience of John Hunter whom he calls the founder of scientific dentistry. Hunter seems to have known more about the teeth than any of his successors for 75 years, and his knowledge of eruption is not inferior to our own.

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EDITORIALS

Some Thoughts on the Study of the Etiology of Angle's Class II Malocclusal Manifestations

EDITORIAL consideration is given the paper dealing with "Studies on the Etiology of Angle's Class II Malocclusal Manifestations," because the editor was prevented from discussing the paper at the time it was given before the society, and because it contains some statements of facts that may be interpreted in a slightly different way than the author of the paper interpreted them.

As far as posterior occlusions are concerned, the author seems to lean to the idea that mouth-breathing, diseases of the nasal passages, adenoids and tonsils have very little to do with the production of the deformity, or in fact with any other malocclusion. While it is possible that we may find fin

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ger, tongue, and lip sucking habits in a large number of children who present malocclusions, it is also equally true that we find finger, tongue, and lip sucking habits in just as many more children who do not have malocclusions.

This statement is made because of the editor's association, during his medical student days, with a number of children's hospitals in the Middle West and with men who have devoted their lives to the treatment of children's diseases and have seen so many patients with the above habits who do not possess deformities.

We know of many individuals who have been lip, finger and tongue suckers for years even during adult life, who have never developed malocclusions. Therefore, we are inclined to believe that finger, tongue and lip sucking habits do not always produce malocclusion. In other words, lip sucking in the majority of cases simply happens to be a nervous manifestation which is the result of a cause and this cause may be a factor which predisposes toward the malocclusion. We have seen but few cases during our years of private practice and clinical work that we feel were influenced to any great extent by finger, tongue, and lip sucking habits. Many cases have come to our observation which have convinced us that a series of pathologic conditions of the nose and nasopharynx were very largely responsible for the production of the malocclusion.

It has been our fortune during the past twenty years to have been closely associated with the practice or teaching of orthodontia on the Pacific Coast, in the Middle West, and the region of the Great Lakes and on the Atlantic Seaboard. The prevailing types of malocclusion differ greatly in different localities. In the region of the Atlantic Seaboard and the Great Lakes with the cold winters and the sudden changes of temperature, we find many adenoids, hypertrophied tonsils, diseases of the nasal cavities, and similar conditions which produce mouth-breathing and abnormal muscular actions. These cases are more numerous than in the Middle West and on the Pacific Coast. In the southwestern region where the individual is subject to high temperature, long summers, and mild winters, the inflammation of the nasopharynx, adenoids and enlarged tonsils are a rarity and the number of posterior occlusions are also very small. While in private practice in Kansas City and also in the clinic at the Kansas City Dental College, posterior occlusions were far in the minority, in the clinic in New York they have a high average. We do not believe there are any more individuals with finger, tongue or lip sucking habits in New York than in Missouri, but there are more cases of adenoids and enlarged tonsils and more mouth-breathers. Therefore, our observance is at variance with Doctor Hellman's, and until he has made examinations in different localities, we cannot accept his opinion that mouth-breathing and inflammation of the nasopharynx, adenoids, and diseased tonsils do not play a greater part in the production of malocclusion than finger, tongue and lip sucking habits unassociated with mouth-breathing.

Doctor Hellman is inclined to believe that mouth-breathing plays a very little part in the production of posteroclusions with linguoversion of the maxillary incisors, or the so-called "Class II, Division 2." We will admit that such

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cases as he cites as being posteroclusions with linguoversion of the maxillary incisors or "Class II, Division 2," are not influenced very much by the mouth-breathing, because these *cases* cited are not posteroclusions, as is shown in Figs. 1, 2, and 3, and also in his description of the development of the maxilla and mandible of this particular case.

The influence of muscles and improper function which occurs in mouth-breathing cannot be waved aside so easily. Dr. Rogers in his papers further proves this by setting forth the results obtained by giving special attention to producing a tonicity of the muscles which come into normal function with normal breathing. The proper actions of the muscles of expression, respiration, and deglutition are interfered with in mouth-breathing, and they play a much more important part in the production of posteroclusion than do habits.

Individuals who are suffering from adenoids and enlarged tonsils are very apt to form the habit of sucking the finger, thumb, lip, or some other object. Among men limiting their practice to the diseases of children the habit of sucking the thumb, blanket or some other object, is considered a symptom of enlarged lymphatic tissue in the nasopharynx. In fact we have known physicians who were willing to make a diagnosis of adenoids on the fact that a child persistently sucked. The anatomic location of the pharyngeal tonsil is posterior and above the soft palate. The nasopharynx is blocked by this mass of lymphatic tissue growing downward and forward against the soft palate. During sucking the soft palate is pulled forward and a greater space is created between the soft palate and the pharyngeal tonsil and therefore the child is enabled to breathe more freely. The base of the tongue is also pulled forward, increasing the space in the fauces and thus allowing the individual to breathe easier. In a large number of posteroclusions and other malocclusal manifestations where there is inflammation of the nasopharynx and adenoids and enlarged tonsils, the youngster will be a finger sucker, but these habits are the result of a cause, often removed by the cleaning out of the nasopharynx so that the child can breathe properly.

Owing to the fact that Doctor Hellman has found so many sucking habits in the cases he has investigated, he has permitted himself to become enthusiastic on that subject. This is proved by his paper in which he says "I do not know whether this habit is acquired during labor or immediately after birth or before birth." For a number of years we gave our attention to anatomy and also spent some time in studying embryology and reading books on that subject, as well as obtaining information by dissecting embryos. In the face of that experience we are unable to understand how it is possible for a child to suck his finger or thumb or lip before he is born. Sucking and respiration cannot take place *in utero,* therefore such a thing as the sucking habit before birth is absolutely impossible.

In regard to the theory advanced by Doctor Michio Inouye that the hands are employed in pressing the mandible downward during the formation of the palate, we can only say that there is no evidence to substantiate it. As the embryo develops in the uterus the hands may assume a position close to the mouth because of the anatomic association of parts and because the arms must

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be folded somewhere. This does not mean that the fetus is sucking its thumb or that the hands are depressing the mandible during the formation of the hard palate.

Doctor Hellman's inferences that posteroclusions may be the result of inharmonious developments or disturbances of growth during a certain period, is interesting and probably possesses some truth. However, his statements that cleft palate and harelip are the result of the improper size of the parts is not exactly true and, in fact, is not true in the majority of instances. In most cases of harelip and cleft palate that we have seen, and the observation of other men is the same, there is a sufficient development of those structures but, for some reason or other, a failure of union. The nasal buds, which carry the maxillary incisors, most often are of full size. The palatal processes of the superior maxillary bone are generally fully developed, and they failed to unite because of improper position.

Doctor Hellman states that in many of these cases teeth are missing and deformed. He undoubtedly has mistaken the deformed teeth which he has seen after the surgical operation as the original condition. Doctor Federspiel has long contended that the so-called "Brophy Operation" produces great damage to the tooth germs, and I simply mention this to show, as Doctor Hellman admits, that there are many factors that produce malocclusion. I believe it is an incorrect thing to attribute malocclusions to the sucking habit because that habit has been found to prevail in a number of individuals who have malocclusions when we find more youngsters with normal occlusions who suck their fingers and thumbs. Some physicians contend that sucking of the finger or thumb tends to assist in the circulation of the blood in the cranial cavity. I know that adult persistent finger or thumb suckers admit they do it when they are tired and do not have such a desire when they are not tired.

Following the influence of the sucking habits upon the human race, there are a great many men who persistently suck cigars or cigarettes. They derive a certain satisfaction from the smoke and also pleasure from sucking the cigarette or the cigar, the same as the child does in sucking his finger or thumb. We could attribute all of the ills of the human family to finger, tongue, lip, cigar and cigarette sucking habits and probably be about as correct as in attributing a large percentage of malocclusion to this habit.

The Need for More Careful Diagnosis of Malocclusion

IN this issue of the JOURNAL we publish an excellent paper by Dr. Milo Hellman on "Studies on the Etiology of Angle's Class II Malocclusal Manifestations."

This paper, like all papers written by Dr. Hellman, is the result of an enormous amount of time spent on investigation. It also shows a necessity for more careful consideration of some factors. It shows the need of a more careful diagnosis of malocclusion and the use of terms which are more explanatory than the so much used Class II, Division 1, and Class II, Division 2. It also necessitates a more careful consideration of what is really meant by Class

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II, or distoclusion, as the term has been adopted by the American Society of Orthodontists. A Class II malocclusion is a condition in which the mandibular arch is posterior to normal as judged by the maxillary arch, the cranial and facial developments. In fact, when we speak of posterior relations of the mandibular arch, we are referring to posterior positions as related to the face and cranium more than we are to the maxillary teeth. Doctor Case has long criticized the Angle classification because Dr. Angle did not recognize certain possible conditions in each maxillary arch.

Certain maxillary teeth may take anterior positions and the mandibular teeth be normal anteroposteriorly. While the editor has never seen a case of all of the maxillary teeth assuming an anterior position, he is willing to agree with Dr. Case, as a scientific argument that such a thing is possible, and if the maxillary teeth were anterior, it would be entirely different from a posterior position of the mandibular arch or Angle's Class II.

Doctor Hellman in criticizing the term distoclusion calls attention to the fact that according to strict anatomical terminology, the so-called "Class II," or distoclusion, should in reality be called a posteroclusion. Now if we recognize or understand "Class II" either Division 1 or 2 according to Angle's terminology, to be those conditions in which the mandibular teeth have assumed a posterior relation to normal, we would not make the mistake of calling such cases as shown by Hellman in Figs. 1, 2 and 3, "Class II, Division 2-subdivision." This case is not a Class II, Division 2-sub-division because the mandibular arch is not posterior.

According to the terminology as adopted by the American Society of Orthodontists and suggested by Doctor Lischer, Figs. 1, 2 and 3 of Hellman's article show a case of neutroclusion with mesioversion of the right maxillary teeth. A typical Class II, Division 2, according to Angle's terminology would be a case in which the mandibular arch was posterior and in which the facial balance of the individual could only be established by moving the mandibular arch forward. Doctor Case has contended for a number of years and Doctor Lischer has also called our attention many times to the fact that: in malocclusion diagnosis, we must consider the facial outline of the patient as well as the inclined planes of the teeth. You cannot take one arch as being fixed or any one tooth as being fixed in the arch, and we should change our terminology and ideas, and realize that Class II, or distoclusion, should be called posteroclusion and should be defined as those conditions in which the mandibular arch has assumed a posterior relation to the maxillary arch as related to the face and cranium.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The American Society of Orthodontists

The Annual Meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., on April 24, 25, and 26, 1922. Following is a preliminary announcement of the program:

President's Address,
Dr. Martin Dewey,
New York.

Bone Cells in Relation to Bone Growth and Repair,
Dr. Theo. H. Bast,
University of Wisconsin.

Indirect Method of Making Orthodontic Appliances,
Dr. Leuman H. Waugh,
New York.

Status Thymico Lymphaticus with Special Consideration of Growth Defects and their Anatomic Compensation,
Dr. Walter Timme,
New York.

Case Reports by:
- Dr. Clinton C. Howard, Atlanta, Ga.
- Dr. Lawrence Baker, Boston, Mass.
- Dr. W. K. Slater, Knoxville, Tenn.
- Dr. Charles R. Baker, Evanston, Ill.
- Dr. J. A. Burrill, Chicago, Ill.
- Dr. Ernest N. Bach, Toledo, Ohio.
- Dr. Frank M. Casto, Cleveland, Ohio.
- Dr. Walter H. Ellis, Buffalo, N. Y.
- Dr. Harry E. Kelsey, Baltimore, Md.
- Dr. Carl B. Case, Milwaukee, Wisc.
- Dr. S. L. Kregarman, New York City.
- Dr. R. C. Willett, Peoria, Ill.
- Dr. F. C. Kemple, New York City.

Application of Spring Force from Gold Platinum Removable Appliances,
Dr. Martin Dewey,
New York.

Some Physiological Principles in Orthodontia,
Dr. Martin H. Fisher,
University of Cincinnati,
Cincinnati, Ohio.

Early Treatment,
Dr. A. H. Ketcham,
Denver, Colorado.

A Preliminary Report on Research Work being conducted by,
Dr. Milo Hellman,
New York.

A Study of Third Molar Impaction, Associated with Orthodontic Retention,
Dr. Varney E. Barnes,
Cleveland, Ohio.

- Dr. A. Fernald, Boston, Mass.

Clinicians:
- Dr. Leuman M. Waugh, New York City.
- Dr. Norris C. Leonard, Baltimore, Md.
- Dr. C. A. Hawley, Washington, D. C.
- Dr. Varney E. Barnes, Cleveland, Ohio.
- Dr. Carl B. Case, Milwaukee, Wisc.
- Dr. Ernest N. Bach, Toledo, Ohio.
- Dr. R. W. Noland, Des Moines, Ia.
- Dr. George B. Crozat, New Orleans, La.
- Dr. Samuel E. Johnston, Kansas City, Mo.
- Dr. Lourie J. Porter, New York City.
- Dr. James B. Morrison, Montreal, Can.

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Southwestern Society of Orthodontists

The Annual Meeting of the Southwestern Society of Orthodontists will b held at Oklahoma City, Okla., Skirvin Hotel, April 22nd. All ethical practi tioners welcome.

PROGRAM

9:00 A.M.—Address of Welcome, Dr. John Payne, President Oklahoma City Dental Societ Oklahoma City, Oklahoma.

9:20 A.M.—Response, and President's Address, Dr. T. O. Gorman, San Antonio, Texas.

10:00 A.M.—(1) Clinic—A Method of Constructing and Repairing Lingual Arches Withou Removing Molar Bands, Dr. E. B. Arnold, Houston, Texas.

(2) Clinic—Some Uses for the Reverse Curve Finger Spring, Dr. W. E. Fleshe Oklahoma City, Oklahoma.

(3) Clinic—Treatment of Impacted Teeth, Dr. T. M. Robertson, Coffeyville, Kan

(4) Clinic—Combination Lingual and Buccal Appliance for Expanding Arche Dr. R. T. Chapman, El Paso, Texas.

11:00 A.M.—Business session.

11:45 A.M.—Luncheon—Skirvin Hotel.

Paper—Malocclusion of the Teeth and the Impending Deformities, Dr. Hugh Tanzey, Kansas City, Mo.

1:30 P.M.—Paper—What We Hope to Accomplish in our Efforts at Orthodontic Treatmen Dr. T. G. Duckworth, San Antonio, Texas.

2:00 P.M.—Movie—Adjustment of the Ribbon Arch Appliances by Dr. Angle, Dr. W. Sorrels, Oklahoma City, Oklahoma.

2:30 P.M.—Case reports:

It is the object to fill this time with the presentation and discussion of case which may impart information or on which information may be desired. This can made very interesting if you will submit cases. Kindly have brief history and synops outlining treatment written.

3:30 P.M.—Automobile tour of the City.

5:00 P.M.—Dinner.

6:00 P.M.—All aboard, special Rock Island Pullman to Chicago. Kansas and Kansas Cit men will board same car enroute.

The American Society of Dental Radiographers

The annual meeting of the American Society of Dental Radiographe will be held at the Ambassador Hotel, Los Angeles, California, Wednesda and Thursday, July 19 and 20. The Program Committee has arranged for a interesting and scientific meeting. All those extremely interested in Dent Radiography are cordially invited to attend. H. C. McKittrick, Presiden I. O. O. F. Bldg., Indianapolis, Ind., Martin Dewey, Sec.-Treas., 501 Fift Ave., New York, N. Y.

Notes of Interest

Dr. Walter Hyde announces the removal of his office to 434 LaSall Building, Minneapolis, Minn. Practice limited to orthodontia.

John Edward Taylor, D.D.S., announced a practice limited to orthodonti 6778 Hollywood Blvd., Hollywood, California.

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ORIGINAL ARTICLES

A CONSIDERATION OF NORMAL AND ABNORMAL DENTURES AS A PROBLEM OF THREE DIMENSIONAL SPACES AND ITS BEARING ON ORTHODONTIC CLASSIFICATION AND TERMINOLOGY*

BY FREDERICK LESTER STANTON, D.D.S., NEW YORK CITY

"OF THE chemistry of his day and generation, Kant declared that it was 'a science, but not science,'—'eine Wissenschaft, aber nicht Wissenschaft;' for that the criterion of physical science lay in its relation to mathematics. And a hundred years later Du Bois Reymond, profound student of the many sciences on which physiology is based, recalled and reiterated the old saying, declaring that chemistry would only reach the rank of science, in the high and strict sense, when it should be found possible to explain chemical reactions in the light of their causal relation to the velocities, tensions and conditions of equilibrium of the component molecules; that, in short, the chemistry of the future must deal with molecular mechanics, by the methods and in the strict language of mathematics, as the astronomy of Newton and Laplace dealt with the stars in their courses. We know how great a step has been made towards this distant and once hopeless goal, as Kant defined it, since van't Hoff laid the firm foundations of a mathematical chemistry, and earned his proud epitaph, *Physicam chemiae adiunxit.*

"We need not wait for the full realization of Kant's desire in order to apply to the natural sciences the principle which he urged. Though chemistry fall short of its ultimate goal in mathematical mechanics, nevertheless physiology is vastly strengthened and enlarged by making use of the chemistry,

*Read before the New York Society of Orthodontists, New York, Feb. 8, 1922.

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as of the physics, of the age. Little by little it draws nearer to our conception of a true science, with each branch of physical science which it brings into relation with itself; with every physical law and every mathematical theorem which it learns to take into its employ. Between the physiology of Haller, fine as it was, and that of Helmholtz, Ludwig, Claude Barnard, there was all the difference in the world.

"As soon as we adventure on the paths of the physicist, we learn to weigh and to measure, to deal with time and space and mass and their related concepts, and to find more and more our knowledge expressed and our needs satisfied through the concept of number, as in the dreams and visions of Plato and Pythagoras; for modern chemistry would have gladdened the hearts of those great philosophic dreamers.

"But the zoologist or morphologist has been slow, where the physiologist has long been eager, to invoke the aid of the physical or mathematical sciences; and the reasons for this difference lie deep, and in part are rooted in old traditions. The zoologist has scarce begun to dream of defining, in mathematical language, even the simpler organic forms. When he finds a simple geometrical construction, for instance in the honeycomb, he would fain refer it to physical instinct or design rather than to the operation of physical forces; when he sees in snail, or nautilus, or tiny foraminiferal or radiolarian shell, a close approach to the perfect sphere or spiral, he is prone, of old habit, to believe that it is after all something more than a spiral or a sphere, and that in this 'something more' there lies what neither physics nor mathematics can explain. In short he is deeply reluctant to compare the living with the dead, or to explain by geometry or by dynamics the things which have their part in the mystery of life. Moreover he is little inclined to feel the need of such explanations or of such extension of his field of thought. He is not without some justification if he feels that in admiration of nature's handiwork he has an horizon open before his eyes as wide as any man requires. He has the help of many fascinating theories within the bounds of his own science, which, though a little lacking in precision, serve the purpose of ordering his thoughts and of suggesting new objects of enquiry. His art of classification becomes a ceaseless and an endless search after the blood-relationships of things living, and the pedigrees of things dead and gone. The facts of embryology become for him, as Wolff, von Baer and Fritz Muller proclaimed, a record not only of the life-history of the individual but of the annals of its race. The facts of geographical distribution or even of the migration of birds lead on and on to speculations regarding lost continents, sunken islands, or bridges across ancient seas. Every nesting bird, every ant-hill or spider's web displays its psychologic problems of instinct or intelligence. Above all, in things both great and small, the naturalist is rightfully impressed, and finally engrossed, by the peculiar beauty which is manifested in apparent fitness or 'adaptation,'—the flower for the bee, the berry for the bird.

"But the physicist proclaims aloud that the physical phenomena which meet us by the way have their manifestations of form, not less beautiful, and scarce less varied, than those which move us to admiration among living

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things. The waves of the sea, the little ripples on the shore, the sweeping curve of the sandy bay between its headlands, the outline of the hills, the shape of the clouds, all these are so many riddles of form, so many problems of morphology, and all of them the physicist can more or less easily read and adequately solve; solving them by reference to their antecedent phenomena, in the material system of mechanical forces to which they belong, and to which we interpret them as being due. They have also, doubtless their immanent teleological significance; but it is on another plane of thought from the physicist's that we contemplate their intrinsic harmony and perfection, and 'see that they are good.'

"Nor is it otherwise with the material forms of living things. Cell and tissue, shell and bone, leaf and flower, are so many portions of matter, and it is in obedience to the laws of physics that their particles have been moved, molded and conformed.

"How far, even then, mathematics will suffice to describe, and physics to explain, the fabric of the body no man can foresee. It may be that all the

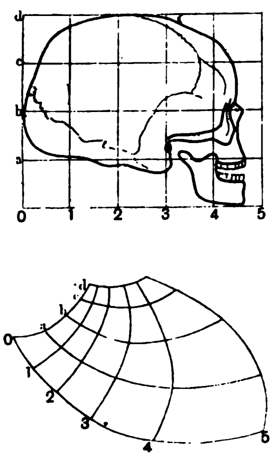

Fig. 1.—The human skull is shown by Thompson with the superimposed Cartesian coordinates. (1, 2, 3, 4, and a, b, c, d.) By plotting a series of homologous points on the skull of a chimpanzee, and drawing a smooth curve through these points we have the deformed grid related to the chimpanzee's skull.

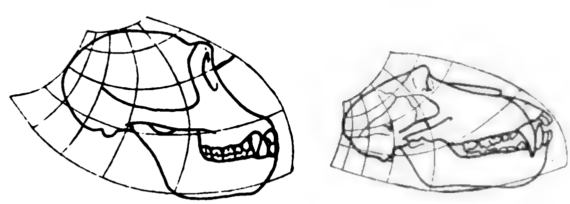

Fig. 2.—This grid is shown in Fig. 1, the curves being projections of the coordinates on the human skull. By this graphic method Thompson is able to show the prognathism and small brain of the chimpanzee as compared to man. Fig. 2 also contains skull of baboon, showing the deformed grid as related to this order and permitting a comparison with man and the chimpanzee.

laws of energy, and all the properties of matter, and all the chemistry of all the colloids are as powerless to explain the body as they are impotent to comprehend the soul. For my part, I think it is not so. Of how it is that the soul informs the body, physical science teaches me nothing; consciousness is not explained to my comprehension by all the nerve-paths and 'neurones' of the physiologist; nor do I ask of physics how goodness shines in one man's face and evil betrays itself in another. But of the construction and growth and working of the body, as of all that is of the earth earthy, physical science is, in my humble opinion, our only guide.

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"Often and often it happens that our physical knowledge is inadequat to explain the mechanical working of the organism; the phenomena are super latively complex, the procedure is involved and entangled, and the investiga tion has occupied but a few short lives of men. When physical science fall short of explaining the order which reigns throughout these manifold phenom ena,—an order more characteristic in its totality than any of its phenomena i themselves,—men hasten to invoke a guiding principle, and entelechy; or cal it what you will. But all the while, so far as I am aware, no physical law and more than that of gravity itself, no not even among the puzzles of chem

Fig. 3.—Thompson's *Growth and Form* shows the nautilus is formed on a true legarithmic spiral.

Fig. 4.—Jay Hambidge (Dynamic Symmetry) shows the Greeks and Egyptians were familiar with the geometrical forms of living things, especially the spiral and related figures as shown in Fig. 3.

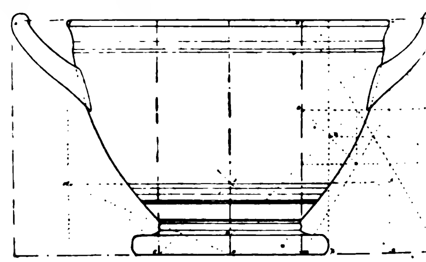

Fig. 5.—The vase shown in Fig. 4 is analyz in Fig. 5 and shows that the craftsman who d signed this vase was not only familiar with geo etry but also the geometry of living things.

ical 'stereometry,' or of physiologic 'surface-action' or 'osmosis,' is know to be transgressed by the bodily mechanism.

"The terms Form and Growth, which make up the title of this littl book, are to be understood, as I need heardly say, in their relation to th science of organisms. We want to see how, in some cases at least, the form of living things, and of the parts of living things, can be explained b physical considerations, and to realize that, in general, no organic form exist save such as are in conformity with ordinary physical laws. And whil

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growth is a somewhat vague word for a complex matter, which may depend on various things, from simple imbibition of water to the complicated results of the chemistry of nutrition, it deserves to be studied in relation to form, whether it proceed by simple increase of size without obvious alteration of form, or whether it so proceed as to bring about a gradual change of form and the slow development of a more or less complicated structure.

"In the Newtonian language of elementary physics, force is recognized by its action in producing or in changing motion, or in preventing change of motion, or in maintaining rest. When we deal with matter in the concrete, force does not, strictly speaking, enter into the question, for force, unlike matter, has no independent objective existence. It is energy in its various forms, known or unknown, that acts upon matter. But when we abstract our thoughts from the material to its form, or from the thing moved to its motions, when we deal with the subjective conceptions of form, or movement, or the movements that change of form implies, then force is the appropriate term for our conception to the causes by which these forms and changes of form are brought about. When we use the term force, we use it, as the

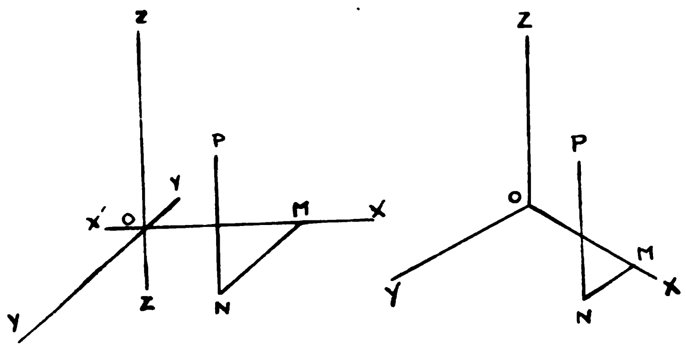

Fig. 6.—Left hand figure to illustrate the octants made by the three reference planes. Point *P* is represented in an octant. Right hand shows the octant containing *P*.

physicist always does, for the sake of brevity, using a symbol for the magnitude and direction of an action in reference to the symbol or diagram of a material thing. It is a term as subjective and symbolic as form itself, and so is appropriately to be used in connection therewith.

"The form, then, of any portion of matter, whether it be living or dead, and the changes of form that are apparent in its movements and in its growth, may in all cases alike be described as due to the action of force. In short, the form of an object is a 'diagram of forces,' in this sense, at least, that from it we can judge of or deduce the forces that are acting or have acted upon it: in this strict and particular sense, it is a diagram,—in the case of a solid, of the forces that have been impressed upon it when its conformation was produced, together with those that enable it to retain its conformation; in the case of a liquid (or of a gas) of the forces that are for the moment acting on it to restrain or balance its own inherent mobility. In an organism, great or small, it is not merely the nature of the motions of the living substance that we must interpret in terms of force (according to

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kinetics), but also the conformation of the organism itself, whose permanen or equilibrium is explained by the interaction or balance of forces, as describ in statics.

"Morphology then is not only a study of material things and of t forms of material things, but has its dynamical aspect, under which we de with the interpretation, in terms of force, of the operations of energy. A here it is well worth while to remark that, in dealing with the facts of embr ology or the phenomena of inheritance, the common language of the boo seems to deal too much with the material elements concerned, as the caus of development, of variation or of hereditary transmission. Matter as su produces nothing, changes nothing, does nothing; and however convenient may afterwards be to abbreviate our nomenclature and our descriptions, must most carefully realize in the onset that spermatozoon, the nucleus, t chromosomes or the germ-plasm can never act as matter alone, but only seats of energy and as centres of force."* (Figs. 1, 2, 3, 4, 5.)

Precise measurements of the normal human denture reveal the sy metrical arrangement of the teeth in three dimensions.

Precise measuring, connotes the intelligent use of precision instrume with results expressed in terms intelligible to any person conversant w dimensional space.

To study the form of a denture we naturally turn to that branch mathematics which has for its province the study of the properties of space geometry. I recall a few of the principles of projective geometry:

Space is filled with points, lines and planes† and these are the eleme out of which our figures are to be formed.

A line is a straight line extending both ways to infinity.

A plane is a plane surface extending in all directions to infinity.

Three planes, which do not meet in a line, have *one single point* in comm A point is determined by three planes which do not pass through a line.

A plane is determined:

By three points which do not lie in a line.

A line is determined by two points.

Descriptive Geometry is concerned with the methods of representing sol and other figures in three dimensions by means of drawings in one pla Britannica, page 707, Vol. II.

Solid Analytical Geometry. Any point in space may be specified by thr coordinates. We consider three fixed planes of reference. Three planes wh are at right angles two and two. They divide all space into eight parts cal octants. (Britannica, 717, Vol. II.) (Fig. 6.) Coordinate is defined as a memb

*In the discussion that followed the reading of this paper it was felt that I had advocated conclusions of Thompson and Hambidge. It would be presumption on my part to assume that I competent to be a judge of their splendid work.

The object of incorporating the extensive quotation from Growth and Form and the illustrat from Dynamic Symmetry was to show that men of science believed in the *mathematical approach* of problem dealing with form and motion even though the form and motion pertain to *living things.*—F. L.

†It is understood that there are other surfaces than planes. Planes being but one of the divisi of the surfaces that are found in space.

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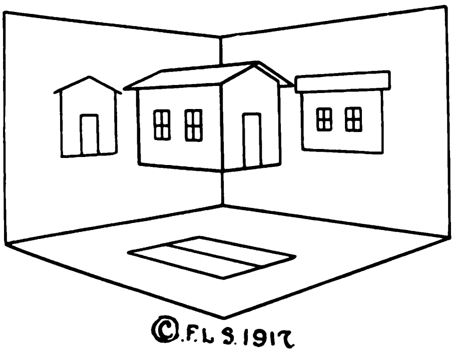
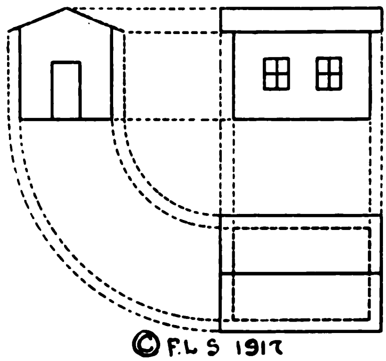
of a system of lines or angles by means of which, as elements of reference, position is determined in relation to certain fixed lines or planes.

Vector, a line conceived to have both a fixed length and a fixed direction in space but no fixed position: That quantity which determines the position of one point in space relative to another, conceived as the line from one to the other.



A.



B.

Figs. 7 A and B.—Illustrative of the principle of orthographic projection. All parts of the object are transferred to planes of projection by slight lines at right angles to those planes. This kind of projection reproduces to full scale all dimensions parallel to the projection plane.

Fig. 8.—Surveying apparatus.

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For convenience in measuring the denture we will resort to projectio[n]. When points in space are projected in straight parallel lines to a plane it [i]s called orthographic projection. (Fig. 7.)

By means of a suitable surveying instrument (Fig. 8) dentures may b[e] orthographically projected in three dimensions.

With these definitions in mind we will proceed to define *the occlusal pla[ne]* and *three reference planes.* All normal deciduous dentures close nearly on [a] plane surface.

All normal permanent dentures, in front of the molar series, are nearly fla[t]. With respect to some plane surface which will conventionally be regarded a[s] horizontal, every maxillary tooth (not a molar) shall extend as far below th[is]

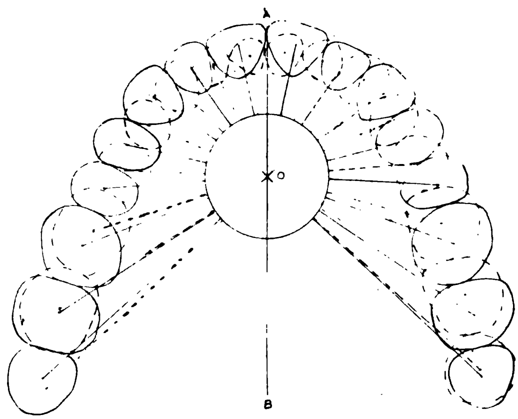

Fig. 9.—Solid lines upper gingival margins. Dotted lines lower gingival margin. Vectors of upper teeth solid lines from *centroid* of teeth to *centroid* of denture at *O.* Vectors of lower teeth dotted line.

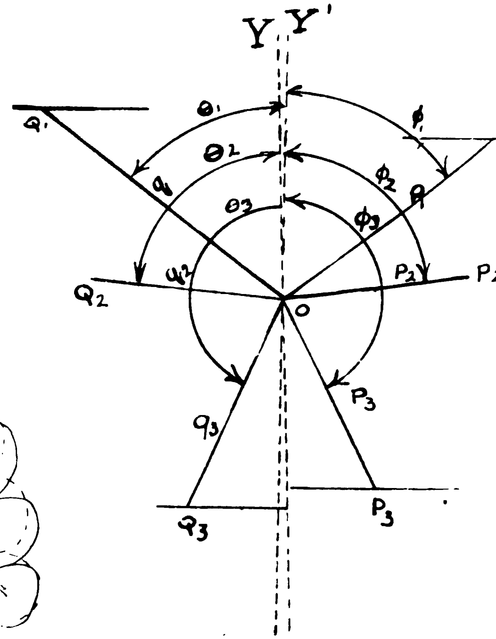

Fig. 10.

plane as the corresponding mandibular tooth extends above it. This plan[e] will be referred to as the *occlusal plane.*

The *centroid* of a tooth may be conventionally defined as the geometrica[l] centroid of the closed line known as the "gingival margin."* The point thu[s] defined is generally neither the geometrical centroid of the tooth nor th[e] physical center of mass. Its only significance is that it is a centrally situate[d] point in the tooth conveniently determinate and marking fairly well the locatio[n] of the tooth as a whole. (Fig. 9.)

The centroid of a denture may be defined as the geometrical centroid o[f]

*If a tooth in normal occlusion were translated on its vertical axis and should perforate a mediu[m] which would register the greatest circumference of the crown the resulting opening would be the "gingiv[al] margin."

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the centroids of all the teeth comprising the denture. In the case of a denture conforming to the criteria for normal configuration, the plane surface containing the centroid of the denture and lying parallel to the occlusal plane, will be called the *plane of horizontal projection* or the *XY-plane.* Generally the XY-plane will lie near the occlusal plane: these two planes will coincide if the centroid of the denture happens to lie in the occlusal plane. These

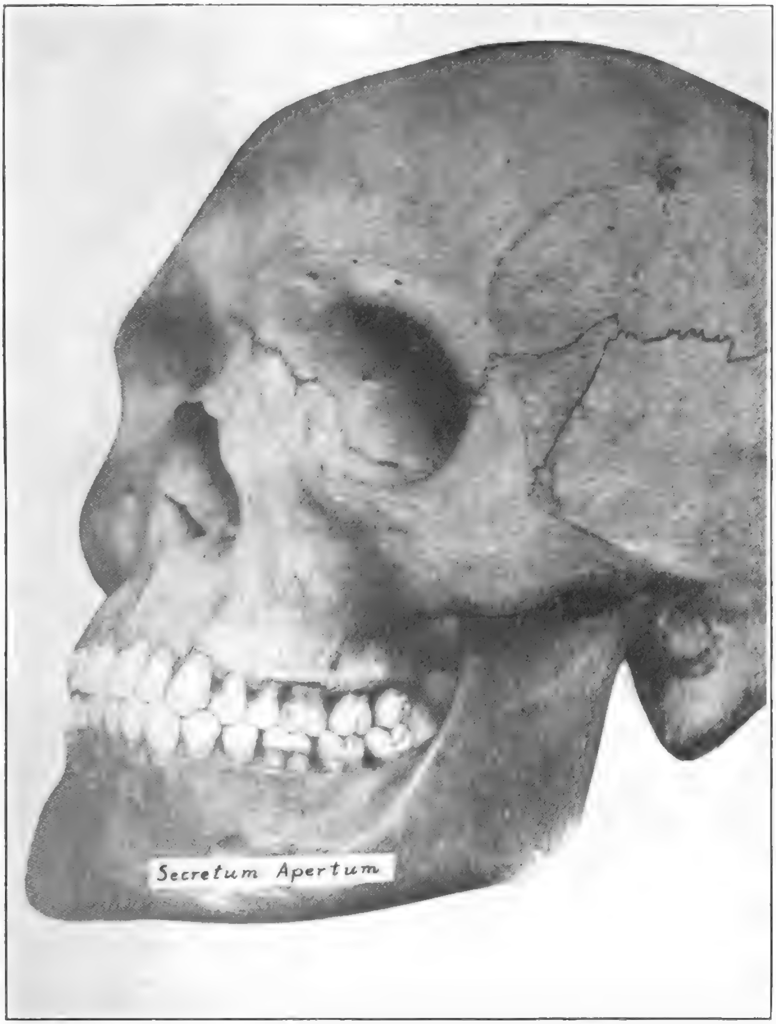

Fig. 11.—Normal occlusion of teeth. Secretum apertum. (Summa.)

planes will conventionally be regarded as horizontal; accordingly, all planes at right angles to them will be vertical.

Centroid of denture at *O* (Fig. 9) is found by measuring from two bases the average distance of the tooth centroids from each of these bases where the lines cross at *O* is the centroid of the denture.

Having obtained the centroid of the denture we now proceed to find the

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axis of symmetry for our group of tooth centroids. (*A-B*, Fig. 9, is axis o symmetry.) (Fig. 10.)

Given a number of pairs of corresponding points, P_1-Q_1, P_2-Q_2, etc., whic are nearly symmetrically disposed on opposite sides of an axis, to find the axi *OY* of least asymmetry, viz., that axis such, that if the plane containin

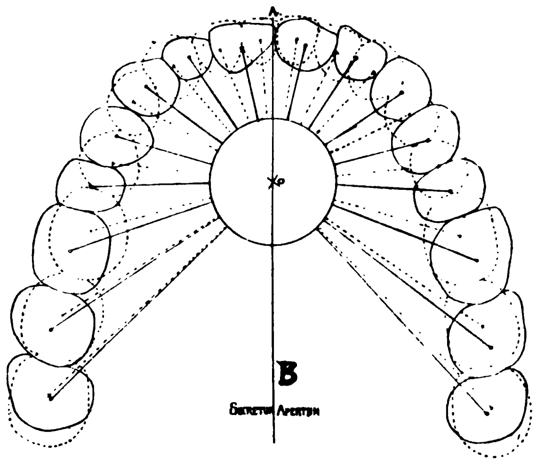

Fig. 12.—Secretum apertum. Uppers solid line, lowers broken line, centroids of teeth, centroids of denture at *O*, axis of symmetry, *A-B*.

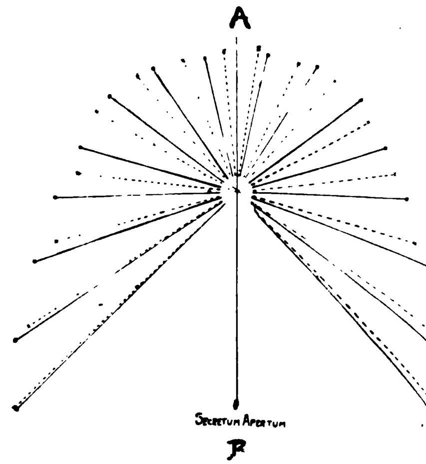

Fig. 13.—Secretum apertum. Tooth centroid centroid of denture at *O*, vectors upper soli line, vectors lower broken line, axis of sym metry, *A-B*.

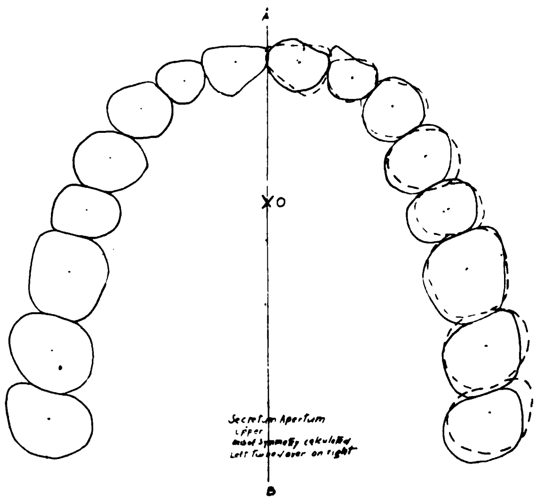

Fig. 14.—Secretum apertum map of upper teeth (plus centroids) in solid lines. Map folded on axis of symmetry *A-B* and the left side traced over right in broken line.

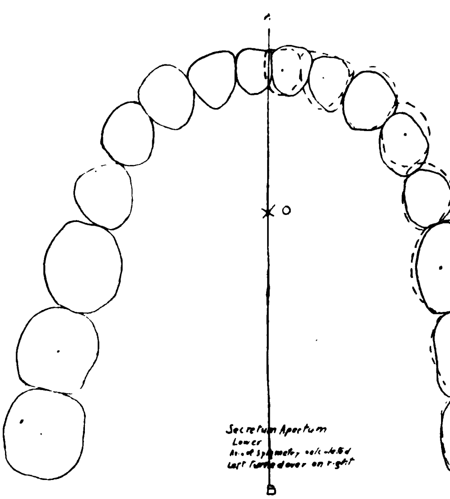

Fig. 15.—Secretum apertum, lower teeth (plu centroids) in solid lines. Map folded on axis o symmetry *A-B* and the left side traced over righ in broken line.

points and axis be folded on that axis, then the *P* points shall as nearly a possible fall upon the corresponding Q points; in mathematical terms, the sun of the squares of the resulting small distances P_1Q_1, P_2Q_2, etc., shall be th least possible.

It can be proved, that the axis must pass through the centroid of th

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system. Let O be the centroid of all the P points and Q points. Through O draw a line OY' bisecting the angle $Q_1\ OP_1$. Measure the angles ϕ, ϕ, etc., between the OY' and the vectors OP_1, OP_2, etc., and also the angles $\theta_1\ \theta_2$, etc., between OY' and the vectors OQ_1, OQ_2 etc. Measure also the lengths p_1, p_2, etc., of the P vectors, and the lengths of the Q vectors.

Form a table as illustrated below, and enter in it the measured values of θ, ϕ, q, p. Find the difference θ-ϕ, the products qp, and the products qp (θ-ϕ). Take the sums in the columns of qp and qp (θ-ϕ), and finally take half the quotient of the latter sum by the former sum. The result, expressed in angular measure, is the value of the angle by which the line OY' diverges from the axis of lease asymmetry, OY. In case the angle be positive, lay it off from OY' toward OQ_1; if negative, lay off toward OP_1.

The method given for computing the angle to be used in locating the axis is not rigorously correct, but is closely approximate when the symmetry is good.

$$\Delta = \frac{+6420}{2 \times 2934} = +1.1^\circ$$

Q	P	Q P	Θ	Φ	Θ-Φ	QP(Θ-Φ)
41.2	36.9	1520	52.7°	52.7°	0.0	0
23.1	24.3	556	84.5°	81.6°	+2.9°	+1610
30.0	28.6	858	156.8°	151.2°	+5.6°	+4810
		2934				+6420

$$\text{angle } \delta = \frac{E[qp(\Theta\text{-}\Phi)]}{2\,E\,[qp]}$$

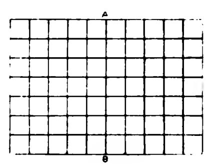

Fig. 16.—Grid for testing symmetry.

Fig. 17.—Wilk's Case.

Let there be passed through the centroid of the denture and axis of symmetry the *plane of maximum symmetry*, this plane will be called the YZ plane (sagittal plane). A vertical plane containing the centroid of the denture and intersecting the XY plane and YZ plane at right angles will be called the XZ plane.

Three reference planes for a denture in normal occlusion have been defined above. They are XY, YZ, and XZ, and they all intersect at the centroid of the denture, which will be taken as the origin of coordinates and designated O. Any orthographic map of the denture will be made by projecting at right angles to one of the three reference planes. If the projecting is done at right angles to the horizontal plane XY, the map will be a horizontal projection;

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if at right angles to YZ *a side elevation;* if at right angles to XZ, *a front or rear elevation.*

The location of any tooth with respect to the reference planes may be given by the coordinates X Y Z denoting the distances of the tooth centroid from the three planes, any single point may be defined in like manner.

In surveying a denture it is important to get the correct level of models in order to establish the plane of projection (XY plane). Let the model of the denture in malocclusion be mounted on a surveying instrument and leveled according to the judgment of the operator, the aim in levelling being to estimate the direction of the XY plane in relation to the model and make this plane parallel to the horizontal motions of the instruments.

Let the model thus mounted be surveyed in three dimensions. The horizontal projection or plane, will not be appreciably affected by faulty levelling unless the vertical malocclusion is extreme and the levelling greatly in error. (In order to avoid waste of time a side elevation can be made in "open or close bite" cases) and this can be tried over a standard side elevation

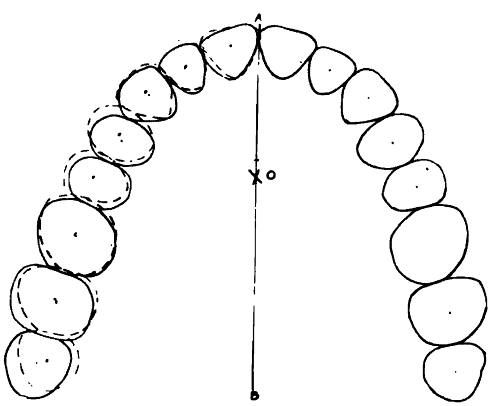

Fig. 18.—Wilk's Case.

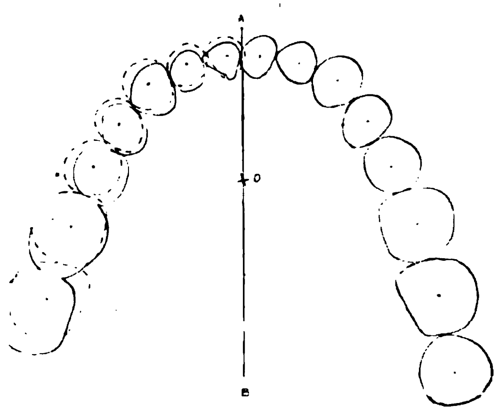

Fig. 19.—Wilk's Case.

taken from a case of normal occlusion any error (in levelling and establishing the XY plane) can readily be detected and the correct level found. A more definite and precise method of levelling will be published shortly in a paper describing arch determination and map placements to produce a minimum of tooth movement.

Secretum apertum, probably the most famous skull in orthodontia will now be analyzed by means of orthographic projections, its symmetry tested by calculating the centroid of the denture and its axis of symmetry. (Fig. 1.) Secretum apertum* (Angle, malocclusion of the teeth, page 15, Fig. 5.)

By means of a transparent sheet ruled in 5 centimeter squares the symmetry of any occlusion or malocclusion may be tested by placing center line A. B. over the axis of symmetry.†

*The surveys of Secretum apertum were made by Dr. Juan Manes Retana, of Madrid, from models (of the skull) made by Dr. J. Lowe Young, who kindly loaned them to the writer.

†The symmetroscope of Gruenburg should be studied by the reader, also its modification by Sheldon Fried, both reported in *Dental Cosmos* of 1912 and 1914. Also the studies of Van Loon, *Dental Cosmos* of 1915 showing the craniophor. Dr. Morse also has used transparent celluloid ruled in squares. Morse measured the asymmetry by placing the celluloid sheet over the mandibular and the maxillary models. Morse axis was established by eye.

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The following figures marked Wilks case were made from models of a patient who had nearly normal occlusion. No legends will be required as it has been treated in the same way as secretum apertum; the legends of which are to be applied to these figures (17 to 20, also Fig. 9).

The two cases show a remarkable degree of symmetry, and present normal occlusion in a new light—a symmetrical arrangement of the tooth centroids about a common centroid *O*. *Homologous tooth centroids having vectors of nearly equal length and angle.*

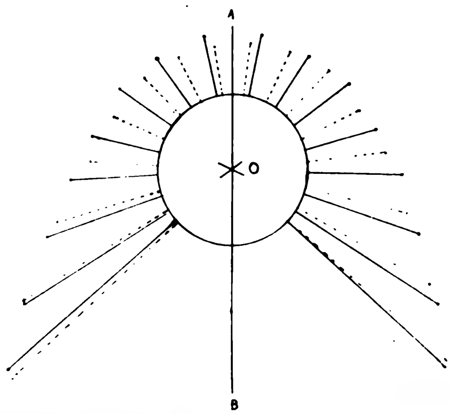

Fig. 20.—Wilk's Case.

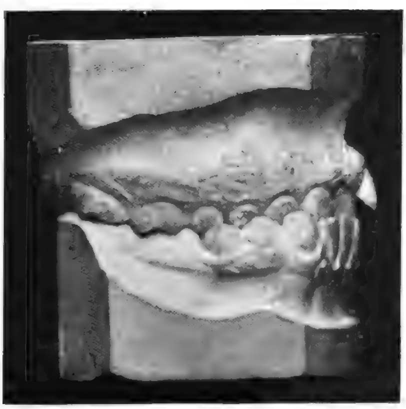

Fig. 21.—Dewey case.

Fig. 22.—Dewey case.

We now propose to test the symmetry of some cases of malocclusion.

Dr. Martin Dewey, after examining our method of determining the axis of symmetry, proposed a test of the method and selected for his test one of the cases in his clinic. (Figs. 21, 22, 23, and 24.)

By placing the cross section paper over this map all asymmetries can be measured. *The line A.B. is the sense line of the denture* and should be of great help to orthodontists. (Figs. 25, 26, and 27.)

The next model to be tested is case No. 1436 of which Figs. 28, 29, 30 and 31 show four views of this case. On the right side the mandibular teeth

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are completely inside the maxillary arch while on the left side shows a nea
approach to the norm.

Figs. 32 and 33 show the maps of the maxillary arch.

The last case I will show is one sent by Dr. Angle for diagnosis. Fou

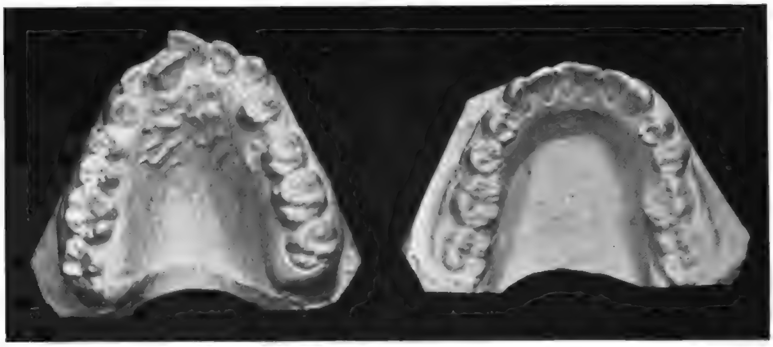

Fig. 23.—Dewey Case.

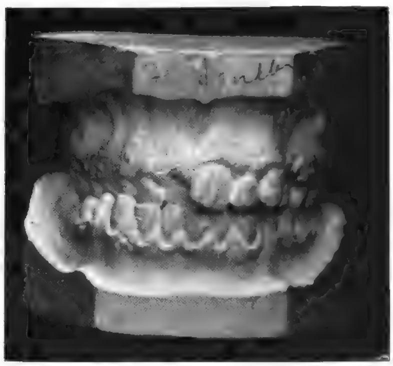

Fig. 24.—Dewey case.

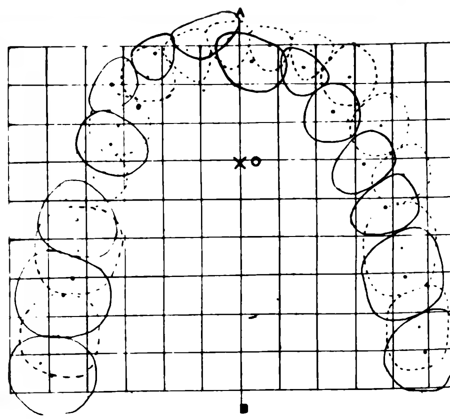

Fig. 25.—Orthographic map of Dewey mod
shown in (Figs. 21, 22, 23, and 24.) Upp
teeth solid lines; lower teeth broken lines, *A*-
axis of symmetry, *O* centroid of denture, squar
5 mm. to test the symmetry, centroids of tl
teeth marked with dots.

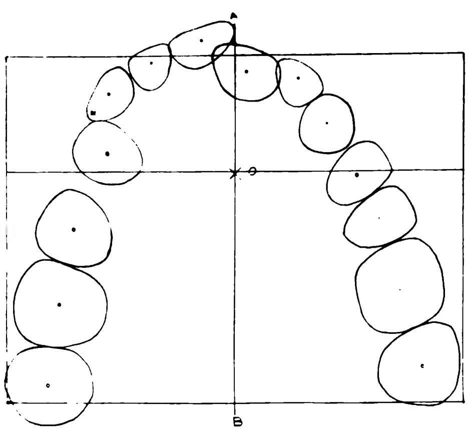

Fig. 26.—Upper jaw, Dewey model.

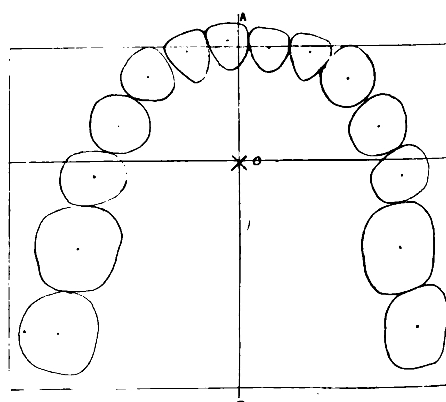

Fig. 27.—Lower jaw, Dewey model.

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views of this model follow. (Note the lower right canine is impacted and its space is occupied by a supernumerary.)

Figs. 34 and 35 show the right and left side of the case.

Figs. 36 and 37 show the front and occlusal views. Figs. 38, 39 and 40 show maps of the above case.

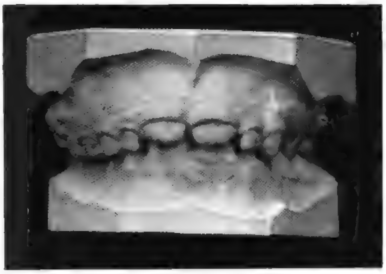

Fig. 28.—Case 1436

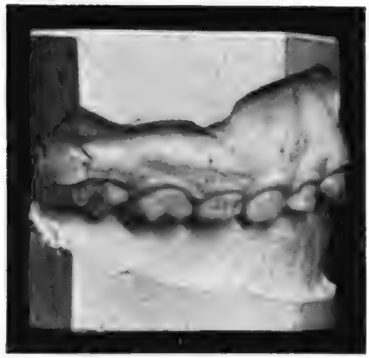

Fig. 29.—Case 1436.

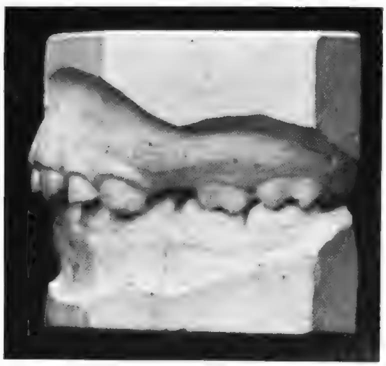

Fig. 30.—Case 1436.

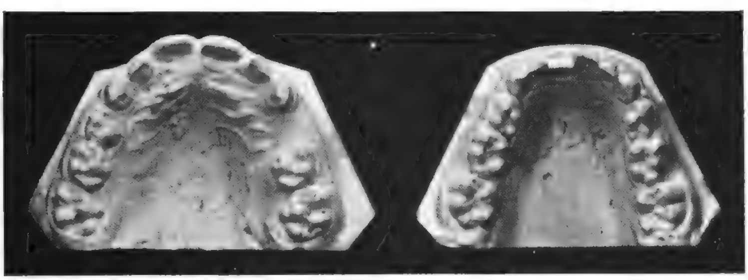

Fig. 31—Case 1436.

The model shown in Figs. 34 to 36 was submitted for classification to fourteen orthodontists with the following results: Eight classified the case as Class II, Division 2, subdivision (distoclusion), one as being Class II, Division 1, subdivision (distoclusion), and five placed it in Class I (neutroclusion).

The Angle classification is based "on the mesio-distal relations of the

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teeth—dental arches and jaws which depend primarily upon the positions mesio-distally, assumed by the first molars on their erupting and locking Hence in diagnosing cases of malocclusion we must consider, first the mesio distal relations of the jaws and dental arches as indicated by the relation of the lower first molars with the upper first molars—the keys to occlusion and second the positions of the individual teeth carefully noting their relations to the line of occlusion." Angle defines the line of occlusion, "as being th line with which in form and position according to type, the teeth must b

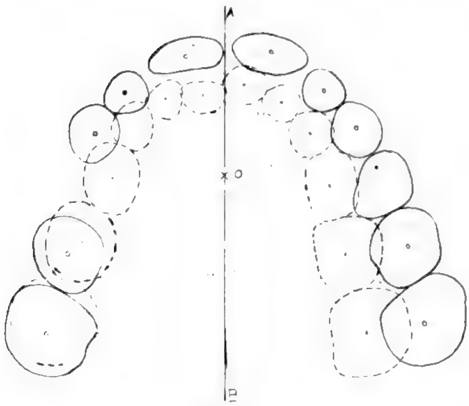

Fig. 32.—Orthographic map of Case No. 1436. Uppers solid lines, lowers broken lines, centroids of teeth are dots, *A-B* axis of symmetry, *O* centroid of denture. Note relation of lower arch on right side.

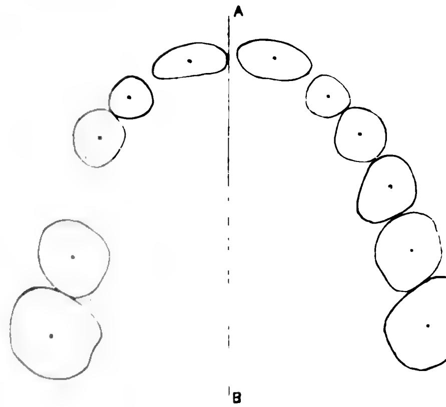

Fig. 33.—Upper map of Case 1436. Ax of symmetry *A-B*.

Fig. 34.—Angle Case.

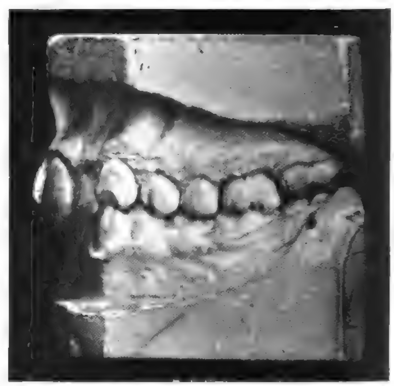

Fig. 35.—Angle Case.

in harmony if in normal occlusion." He further states that "There can b be but one true line of occlusion of each individual and the line of occlusion should be in harmony in form and position with and in proper relation t all other parts of the great structure" i.e., the body.

"We speak of moving a tooth of the lower arch into the line of occlusion or of moving the tooth of the upper arch into the line of occlusion, but i must always be remembered that there can be one *true line of occlusion.*" Angle. "This line describes more or less of a parabolic curve and varies wit

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the limits of the normal according to race, type and temperament. It is difficult to determine exactly what the form of this line should be in each given case."

Angle proceeds to define the positions of teeth in malocclusion in relation to the line of occlusion. "That we should have a line from which to note variations from the normal in the positions of teeth is important," he then proceeds to say there are seven positions of malocclusion:

1. Outside the line, buccal or labial.
2. Inside the line, lingual.
3. Further forward, mesial.
4. Opposite, distal.

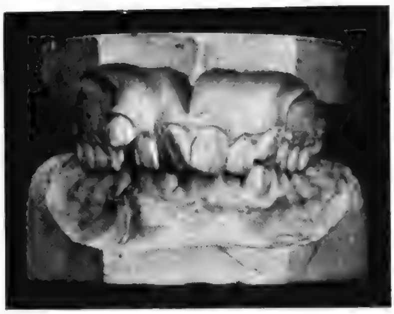

Fig. 36.—Angle Case.

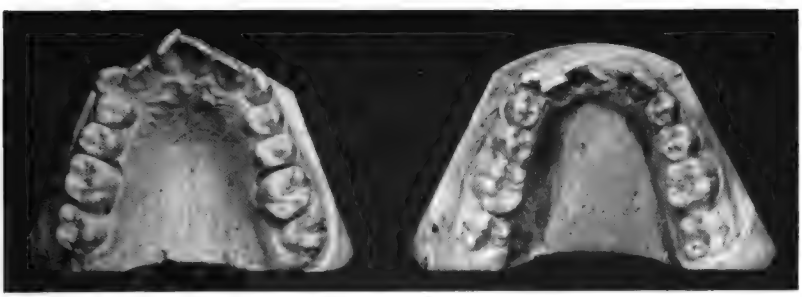

Fig. 37.—Angle Case.

5. Not sufficiently elevated in socket, infra.
6. Too great elevation, supra.
7. If turned on its axis (which axis not stated), torso occlusion.

Angle further states that "the upper first molar furnishes more nearly than other tooth or point in the anatomy an exact scientific basis from which to reason on malocclusion." This attempt to define the malpositions of teeth in reference to a line has led to some curious results. Such a keen observer as Angle states that the malposition of teeth consists principally in the variation of their crowns from the normal with usually little displacement of the apices of the roots. Orthographic projections of malocclusion show many teeth that are much out of position yet requiring translation—the root end moving an equal distance with the crown. Angle in describing an open bite, Class 1

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case, with the molars and premolars in good (page 43) occlusion says, "Fig 24 shows a case where there is infraocclusion of both maxillary and man dibular incisors with probably *slight supraocclusion of the molars.*" If the lin of occlusion has a fixed position in the skull as Angle stated, and supraocclu sion means erupting beyond the line of occlusion how can a maxillary an mandibular molar grow past a fixed line at the same time and yet occlude

In Class II, Division 1, Angle states that the mandibular teeth are distal wit *lengthened* and protruded maxillary incisors—orthographic projections fin

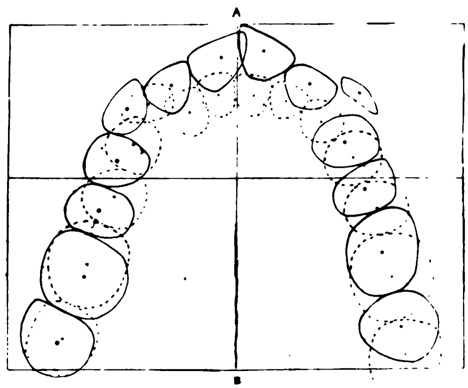

Fig. 38.—Orthographic map of Angle model shown in Figs. 34, 35, 36, and 37. Uppers solid line, lowers broken line. *A-B* axis of symmetry.

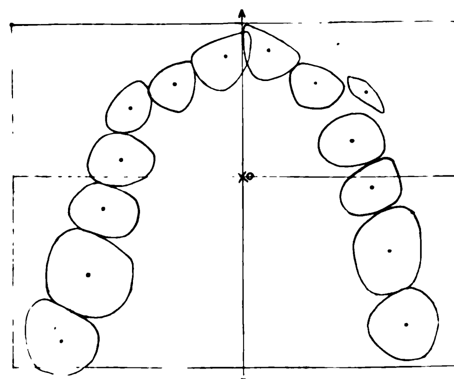

Fig. 39.—Upper map of Angle model. *A-* axis of symmetry and trace of *YZ* plane. Al note trace of the *XZ* plane through the centro of denture at *O*. Note lack of symmetry at en of arch.

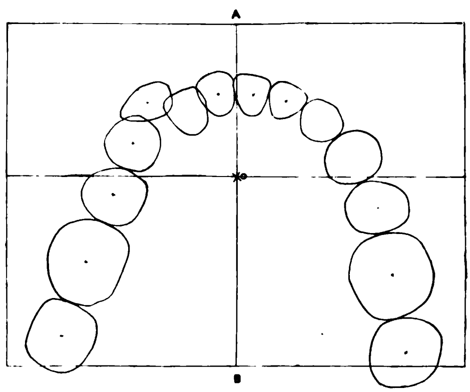

Fig. 40.—Angle model (lower). Axis of symmetry, *A-B*, centroid at *O*, trace of *XZ* plane through centroid *O*.

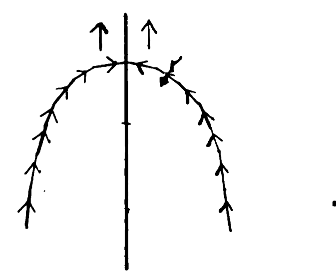

Fig. 41.—Arrows indicate mesial movements applied to individual teeth and to the lower jaw

these teeth shortened. Many other flagrant contradictions could be pointe out but it seems unnecessary. "Any plan which is fundamentally based o an error of principle is doomed to failure."

The writer proposes the abolishment of Angle, Case and Lischer Class fications, together with most of the present terminology of orthodontics. you turn from one text to another you will find error piled on error. Cas 1921 Edition of Dental Orthopedia in defining the occlusal plane says: "Th front part of the lower *plane curves upward.*" "Posteriorly the plane curv

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slightly downward and then as it passes the first molars it again curves slightly upward.'' Planes curving! Oh, shades of Euclid!

A body in space can only be: 1. Rotated on an axis. 2. Bodily displaced. 3. Bodily displaced and rotated.

In translation all points in a body move in similar directions equally.

In rotation a body turns on an axis.

Why should we add such a suffix as ''version'' when we wish to express the position of a tooth in malocclusion?

An incisor bodily displaced toward the lip is said to be in labio-version. Now ''version'' implies a turning. ''Thus if the vector function is the velocity of a fluid at the different points of space its curl or *version* is the rotation of that fluid.'' The suffix version seems a misnomer as it implies that all teeth in malocclusion are rotated upon some axis, *said axis not stated.*

Consider the term mesial, a mesial direction is defined as toward the median line along the curve of the arch.

In Fig. 41 the arrows on the teeth show the various directions of mesial when applied to the different teeth. When the jaw is moved mesially the teeth move with it; the arrows show the direction of movement when the jaw moves mesially. We now find the incisors moving at right angles to the movement we previously designated as mesial. If mesial means toward the median line of the skull, how can a mandible be moved toward the median line when it is on the median line?

Dr. Dewey has pointed out editorially the futility of using mesial and distal.

Dr. Hopewell Smith of Pennsylvania has criticized the orthodontic use of mesial and distal saying we have reversed the anatomical meaning of these words.

It seems futile to further point out the fallacies of our classifications and terminology. They have well served their purpose. I believe the Angle classification will always stand as a great achievement without which orthodontic progress would have been much delayed. Any work I have done has been inspired by my contact with Angle.

''When we sincerely find we cannot agree with the past we must break with it no matter how great the prestige of its messengers.''

So it seems better to adopt a simple precise terminology.

The writer suggests the following: forward or backward, right or left, up or down, rotation.

Forward to mean toward the front of the head in lines parallel to axis of symmetry.

Backward: opposite to forward.

Right or left: direction at right angles to axis of symmetry.

Up and down: parallel motion (up and down) to the vertical plane through axis of symmetry.

Rotation, turning on an axis. Axis to be stated.

Classification is not needed in such a system. The Angle model presented

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today should be sufficient argument against a classification upon which expe cannot agree, especially as treatment of living tissue is based on classificati

The method offered is governed by rigid mathematical formulae eas understood and applied, and has the further advantage of being the langua commonly employed for similar purposes in all other fields of applied ma ematics.

The adoption, more generally, of the mathematical approach for t study of malocclusion may reveal the true deforming forces at work on t human denture leading to the adoption of preventive measures that m supercede our costly and lengthy treatments with mechanical devices.

The author wishes to acknowledge the help of his co-workers: Rudolf Hanau, Di Ing., who designed the surveying apparatus; Gilbert Dudley Fish, C.E., who invented t occlusograph and the formulæ for the axis of symmetry and map placement; Harry A. Go win, M.D., M.E., Louis A. Ungar, D.D.S., who prepared the slides; Juan Manes, M.D., D.D of Madrid, who did some of the surveys, and Mitsuru Okada, D.D.S., of Tokyo, who pho graphed skulls at the National Museum.

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THE INFLUENCE OF CERTAIN ENDOCRINE GLANDS UPON GROWTH AND DEVELOPMENT*

By Emil Goetsch, Ph.D., M.D.

Professor of Surgery and Surgeon in Chief, Long Island College Hospital, Brooklyn, N. Y.

BEFORE considering the specific structure and functions of the endocrine glands, with particular reference to growth and development, it might be well to consider just what is meant by an endocrine or ductless gland. It has long been known, in fact it was demonstrated as early as 1849 by Berthold in his transplantation experiments of the cock's testis, that this gland had an influence by virtue of its growth in the new individual. Although at that time the exact nature was not understood, we now speak of the secretion from such glands as an internal secretion meaning thereby that the specific substance elaborated by the gland is absorbed directly into the blood and lymph and thus gains access to all parts of the body, the final clinical effect being produced by changes in various parts of the body. This idea of an internal secretion was given a further impulse by Bernard's classical investigations on hepatic function showing an internal secretion which is called glycogen in addition to the well-known external secretion, the bile, which is passed through the bile ducts into the intestine.

Certain of the glands in the body have only an internal secretion such as the pituitary gland, the thyroid, possibly the thymus and the adrenal glands. Some have both an external and an internal secretion such as the pancreas, which elaborates the digestive enzymes which are carried in the pancreatic juice to the intestine and an internal secretion elaborated by the well-known structures, called the islets of Langerhans, which structures have no connection with the excretory ducts of the pancreas, but pass their secretion of hormone which has an important carbohydrate regulatory function, directly into the blood stream. It is probable that the ovary and testis should be placed in this same group since we may regard the ovum and spermatozoon as representing the external secretion, whereas, we all know the importance of the internal secretion of both these glands in producing the important changes seen in both males and females, particularly at the time of puberty.

On the other hand there are certain glands, which as far as we know, have only an external secretion. However there are those who feel that even these glands have important internal secretory function. To this group belong the lacrimal and the salivary glands. An endocrine gland then, as the derivation of the name implies, is one which elaborates a secretion which is usually of a complex chemical nature, which is poured directly into the blood stream and which produces its effect by chemical changes within the blood and tissues of the body.

*Read before the New York Society of Orthodontists, New York City, Feb. 8, 1922.

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Another conception which has been gaining more and more support physi ologically and pathologically is this, that these endocrine glands have a important function not only with reference to the organism generally, but tha they have also an important relationship to one another. Consequently on can see the enormous possibilities in pathologic physiology if we realize th direct changes which can follow disease of a ductless gland in addition to th indirect changes dependent upon associated disturbances in the other ductles glands. Thus we know from experimental and clinical investigations tha disturbances in the pituitary gland are associated with disturbances in the se sphere. For example, atrophic changes in the ovary and testis, followed b amenorrhea, sterility and loss of libido, are known to follow disturbances i the function of the pituitary. Experimentally, on the other hand, it was show long ago by Rogowitsch that extirpation of the gland caused what was though to be a compensatory enlargement with an increase of colloid in the pituitary

It may be of interest to discuss briefly the manner in which our knowl edge of the ductless glands has increased so remarkably and gives such won derful promise for the future. The older anatomists occupied themselve with observations upon the structure of the ductless glands. The means fo investigation available at that time were so limited that the work was car ried on under great difficulties. Gradually, however, with the introductio of the microscope it was possible to delve down into the cellular structure o the ductless glands, thus placing our understanding of the normal microscopi anatomy upon a firm basis. Noting then, the intimate structure, certain de ductions could be made as to function, for, as we all know, function is to suc a large extent dependent upon structure. Furthermore, minute pathologi changes associated with general disturbances in the body were more readil recognized, these changes being seen in the microscope long before gros changes were visible to the naked eye. A further help in this direction con tributing largely to the advancement of our knowledge concerning the duct less glands, was possible through the use of the various dyes whose proper ties are now understood and whose manufacture is now possible as a resul of the investigations of Ehrlich. Through differences in staining affinity dif ferent types of cells were recognized and not only was it possible to differen tiate different types but it was even possible to reveal the presence of secre tory granules in the cytoplasm of the gland cells. By following the progres of these granules in several instances the mode of secretion of the gland wa determined, that is, whether the secretion was poured into the excretory duct or into the blood and lymph directly. Following closely upon the contribu tions which the anatomists made to the gross and microscopic structure of th ductless glands, came the very important and in fact the revolutionizing dis coveries which the physiologists made. The gland under investigation wa ground up very minutely and aqueous, saline, alcohol, ether, or in fact an kind of fluid extracts were made and these in turn injected either subcuta neously or intravenously into animals and the effects determined. Thus, fo example, the rise of blood pressure, the vascular constriction and the augmen tation in the force of the heart beat produced by extracts of the pituitar

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gland, were reported by Oliver and Schäfer in 1895. Following in line with this came the observations of Dale and Bell who demonstrated the effect upon contractions of the uterus, the bladder and the intestines, produced by pituitary extract. This discovery has been of inestimable value, for you all know the extensive use of pituitrin in labor and in postoperative distention. Again injections of pituitary extract lower the assimilation rate for carbohydrates and cause glycogenolysis, as shown by me in 1922.

In a similar way the properties of adrenalin, the active principle obtained from the suprarenal gland, were discovered. Again the effects were further investigated by the feeding of either the fresh gland or dried extracts over long periods of time. These have not contributed so much. However, I was able to show that the feeding of pituitary extract to young rats produced early sexual ripening and a demonstrable stimulating effect upon the ovary and the testis. Use has been made of this fact in the giving of pituitary extract to cases of amenorrhea and sterility in the female and loss of power in the male, as a result of pituitary gland tumors. Considerable success has been attained by this method. The experimetal surgeon has contributed his method and results, namely, in the study of transplantation of the ductless glands in whole or in part. Thus the principle formulated by Professor Halsted and based upon his parathyroid studies, namely, that an existing physiologic deficit is one of the essentials for a successful organotransplantation, was evolved. On the whole the results of transplantation of tissues has been disappointing, largely because of the fact that early destruction and absorption of the graft occurs unless the tissue comes from the same individual. Thus, the specificity of each organism for its own tissues, is a striking finding.

Then came the methods of partial or complete extirpation of one of the glands, followed by a study of the after-effects. It was thus that the important functions of the thyroid were recognized, particularly those of deficiency, for it was found that after a complete thyroid extirpation, there resulted a condition known as myxedema characterized by a sluggish mentality, underdevelopment, if the extirpation was done in youth, increase in weight, a subnormal temperature and pulse and an edematous infiltration of the skin and subcutaneous tissues with marked loss of hair. Similarly with extirpation of the pituitary in young animals, there followed failure of sex development, understature, cessation of bony development generally and more particularly of the growth of the skull and the eruption of the teeth. In addition to the effects produced by primary changes due to the extirpation of a single gland, there were also the associated changes produced by alterations in other of the ductless glands, though of less extent.

Nature herself contributed in exhibiting the effects produced by disease of certain of the glands. Thus she herself has performed the experiment and has awaited the investigations of the clinician for the discovery of the effects and subsequent cure. A classical example of this is the immortal discovery of Addison, which attributed a definite clinical syndrome known now as Addison's disease, to the destructive process of disease of the suprarenal capsules. This contribution appeared as early as 1855. To be sure, previous to this Graves

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and Basedow described a malady which we now ascribe to functional disturl
ance of the thyroid, producing the well-known symptom-complex of exophtha
mic goiter. Finally, the most important of all for the present and for th
future, are the contributions which come from the pharmacologists and th
biologic chemist. For, after all, before therapy in endocrine disturbances ca
be satisfactorily standardized and placed upon a firm basis, we must know th
chemical nature of the specific secretions of the ductless glands and must the
be able to produce them synthetically in order to gain the best results and i
order to be able to produce the extracts in sufficient amounts and at reasonabl
cost. Active substances have been obtained from the posterior lobe of th
pituitary gland in the form of pituitrin, a substance which has gained suc
wide usage in the second and third stages of labor and the treatment of inte
tinal distention.

Adrenalin or epinephrin, the active principle of the adrenal glands is no
prepared synthetically. It is standardized and is at the hand of every phys
cian and surgeon to be used both medically and as an adjunct to local nov
caine operations. More recently still the brilliant studies of Kendall, of th
Mayo clinic, have resulted in the better understanding of the chemical natu
of the active principle, thyroxin, of the thyroid gland. Thus far this pri
ciple has been obtained only from the thyroid glands themselves but we fe
sure that it will not be long before the true chemical structure will be reco
nized, whereupon thyroxin can be manufactured in the laboratory and place
at the disposal of the awaiting medical profession. In the end chemical stu
ies will doubtless prove to be of the greatest import, for after all are not th
very life processes themselves evidences of physical chemical change?

After this very brief survey of some of the fundamental methods of i
vestigation used to further our knowledge concerning the ductless glands,
may be of interest to speak of the more specific changes, particularly wit
reference to growth and development, which one finds associated wit
disturbance in the individual endocrine organs. Before speaking of the
clinical states, it is well to mention the phases of secretory activity whic
would apply to practically any of the ductless glands, namely, we speak
hyperfunction, normal function, hypofunction and dysfunction. Hyper an
hypoactivity mean, of course, as the words imply—too much and too litt
secretion of an individual gland. There is one other term which is applie
to describe a disordered secretion and that is dysfunction. By this we mea
that regardless of where the secretion is elaborated and whether in too gre
or too little quantities, the chemical nature of the secretion is probabl
altered by the disease processes of the gland. This is probably the case whe
tumors involve the gland or when chronic infections like tuberculosis an
syphilis have attacked the organ.

Let us consider first the pituitary gland or the hypophysis. It is,
course, beyond the scope of this paper to go into the detailed clinical ph
nomena which are present in pituitary disease, and, therefore, I shall restric
my descriptions largely to the manifestations in growth and developmen
particularly skeletal development since this bears more directly upon th

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field in which you as orthodontists are interested. In hypopituitarism in infancy or childhood, we are concerned with a condition which has been called dystrophia adiposogenitalis, as described by Fröhlich. Fröhlich first drew attention to this syndrome in 1901. The condition is characterized by a rapidly developing adiposity, congenital infantilism and myxedematous cutaneous changes, produced by pituitary tumor with deficient secretion. There is a characteristic distribution of the adipose tissue, the genitalia are infantile, and there is an absence of hair on the genital, axillary and trunk regions. There is an early inhibition of growth and ossification. The skin is strikingly delicate, sometimes dry and slightly scaly, and there are myxedematous-like swellings occurring in the skin. Males afflicted with such a condition remain beardless, the normal changes in voice do not occur, and the vita sexualis is undeveloped. In pituitary insufficiency there is a diminution in the metabolism, particularly in the excessive stages of adiposity. This has even been shown to be the case in dogs in whom the hypophysis has been removed. The reason for the excessive accumulation of fat in pituitary deficiency is doubtless due to the decreased metabolism and to the high tolerance for carbohydrates. This was first shown to be the case experimentally, by myself together with Cushing and Jacobson, and was demonstrated in dogs in whom a partial removal of the pituitary body was done. Almost immediately following the operation, the tolerance for carbohydrates was high. There was a tendency to increased weight just as we see in the clinical cases. A very characteristic finding in pituitary deficiency occurring early, is the inhibition of growth. Individuals suffering with, for example, pituitary tumor occurring before growth has been attained, are of small stature. In practically all cases in which the disease begins at the transition from childhood to adolescence, a retardation of growth has been noted. A great many cases of this kind have been described in the last few years. As a consequence, types of true infantilism result, in which there is an early pituitary deficiency. Where the pituitary deficiency is at all marked, there is disturbance in the appearance of the ossification centers and in the growth of the bone, though the closure of the epiphyses may occur about the normal time. In addition to these general manifestations there are, of course, local manifestations produced by tumor of the pituitary, and of these I may mention the enlargement of the sella turcica and symptoms produced by local pressure, such as headaches, disturbance in vision, optic atrophy at times, and psychic disturbance. The x-ray examination of the skull reveals a widening of the sella turcica with destruction of the primary process and sometimes with erosion of the floor of the sella. The x-ray also helps to determine something with regard to the skeletal growth, inasmuch as in several cases of pituitary deficiency, there is a delayed appearance of the ossification centers and as a result dwarfism may occur.

Since the principal functions of the fetus and developing child are growth and cellular hyperplasia of the various systems and organs and since we know that the importance of certain if not all of the ductless glands, such as the thymus and thyroid, is far greater to the growing organism than

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to the adult, it is readily understood that any influence which might injur the normal function of the gland, would have greater detrimental effect thar in the adult organism which had attained its growth. Again, the correlatior between these glands and the different systems in the growing child is close and far more active than in the adult, a fact which has been abundantly proved by evidence obtained from experiments on young animals as comparec with similar experiments on adult animals. As a good example of this may be mentioned the fact that experimental pituitary deficiency exerts a fa greater inhibitive influence upon the development of the sexual system i young animals than in adults who have attained normal development. As consequence, we have to reckon in the young organism with additional an secondary developmental effects produced by a retarded sexual maturity Thus in the growing organism it is important to have a proper function o every gland and organ in order to avoid interference in the orderly pro gressive differential development of every tissue in the body including suc as the nervous, osseous and glandular systems. One of the glands whos proper function is of the greatest importance to the fetus and the growin child is the thyroid.

A brief account of the results which one may expect as a consequenc of deficient or absent thyroid secretion in infancy and childhood may b given. Thus, absence of the thyroid or its secretion results in one of th most striking types of infantilism, namely, dwarfism. This condition i characterized by disturbance in ossification as is shown by the excessiv retardation of development in the ossification centers, in the closure of th epiphyses, and further in the disturbance of the development in the bon The bone formation so far as it has taken place is, however, of abnorma density. There are, furthermore, disturbances in dentition and in the develop ment of the nervous system in which the mental development particularl suffers. There are also the characteristic myxedematous skin changes an disturbances in the development of the genital apparatus leading to the ele ment of dysgenitalism. It is probable that though the primary and essentia feature of the disease is the absence or diminution of the thyroid secretior there are added secondary features dependent upon disturbance in functio of the remainder of the ductless glands.

The second form of dysthyrogenous infantilism is that known by th term of endemic cretinism and myxedema. This condition is not only de pendent upon goiterous degeneration of the thyroid gland, but it is ver probable that the damaging factors in cretinism influence directly the centra nervous system and the other ductless glands, such as the hypophysis, an thus cause the manifold variable characteristics seen. Such cretinistic individ uals remain very definitely retarded in growth. The disturbances are no necessarily proportionate. Thus ossification may in one instance be princi pally affected. In another the developmental disturbance of the centra nervous system may be predominant. Sometimes the retardation of growt is most noticeable and in other instances the disturbance of the developmenta sphere of the hypophysis may be most noticeable. Again, it is a well-know

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fact that sporadic myxedema may occur not only with its clear-cut signs and symptoms, but also with its less evident manifestations known as "formes frustes." This has led authors such as Huebner and Brissaud to regard all forms of delayed development as dependent in large measure upon a state of dysthyroidism, and, therefore, have recommended treatment with thyroid or thyroidin in all these cases.

Thus far I have considered the hypothyroidism states as they affect growth and development. When we consider the hyperthyroidism states, we find that effects of this nature are very much less pronounced. The reason for this doubtless is that hyperthyroidism as we see it, dependent upon adenoma of the thyroid gland or in the well-known condition of exophthalmic goitre, almost invariably occurs after puberty and usually at the age of 20 to 40, and hence as you see after the period of growth has passed. Consequently, one should not expect developmental changes as a result of hyperthyroidism occurring after the growth period is passed.

Our knowledge of the secretory function of the pineal gland is still shrouded in mystery and until we understand more of the real function of this gland, it will of necessity be impossible to determine the relationship of the latter to the development of the organism. Neither by extirpation of the gland (Dandy) nor by injections of its extract have any definite physiologic functions of this gland been discovered. There is, however, a somewhat general supposition that there is a close relationship between the pineal gland function and growth and sexual development. Horrax reports a stimulating effect exerted by the feeding of pineal extract on the sex glands. Cases of tumor of the pineal gland exhibiting adiposity with sexual infantilism on the one hand and with abnormal increase in stature and precocious sexual development on the other have been described. Whether the pineal function is primarily responsible for these interesting findings is still in doubt, for with tumors of the pineal gland or its neighborhood there is usually an accompanying internal hydrocephalus which may give secondary pituitary deficiency manifestations by interference with the normal secretory process of the hypophysis, which gland as we have seen, is closely related to general development and the acquirement of sexual maturity. V. Frankl-Hochwart regarded the abnormal increase in stature, hypertrichosis, obesity and premature sexual development with precocious adolescence as signs of hypopinealism. If this is true, primary hyperpinealism should be associated with an infantile stature and sexual infantilism, and it is desirable that the pineal gland should be remembered when cases of this kind are met. It would seem then that the functions of the pineal gland are directly antagonistic to those of the hypophysis. It appears then that at the present time it is safe to assume that as a result of certain disturbances of pineal function clinical conditions of infantilism are produced, but that convincing proof of this is lacking.

THYMUS

Thymus hypertrophy and hyperplasia is unassociated with developmental disturbances with the exception possibly in those cases in which the thymus

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hypertrophy and hyperplasia is an evident accompaniment of other conditions in which there is general lymphatism as in status thymicolymphaticus. One would not expect atrophy or tumor destruction of the thymus to lead to any outspoken retardation of development, since we know from the work of Park and McClure that there are no observable effects produced by the extirpation of thymus gland in young animals. Primary hypertrophy and hyperplasia of the thymus that is unassociated with other diseases is very rare. In fact it is doubtful whether the thymus has an internal secretion and therefore it is difficult to conceive a clinical syndrome of primary hyper and hypothymism. Recent experiences, such as those of Park and McClure, have shown that the thymus is not essential to the life of the organism. Therefore we conclude that the thymus does not exert an influence upon growth and development. Clinically those cases of thymic hyperplasia have awakened the most interest. In 1889 Paltauf drew attention to the frequent association of thymus hyperplasia and status thymicolymphaticus with cardiovascular aplasia, and attributed the cause of death in these cases not so much to mechanical pressure as to the disturbances in the vegetative sphere resulting in what he called the lymphatic chlorotic constitution. The frequent occurrence of thymus hyperplasia in diseases of the ductless glands, suggests that it is probably an incidental factor rather than that the hyperplastic thymus is a cause of the developmental disturbances resulting from such diseases. This is an important conception to get because of the fact that so many of the anomalies seen in childhood have been attributed to the thymus.

PANCREAS

The so-called pancreatic infantilism is probably dependent upon true nutritional disturbances and not upon disturbances of the internal secretion of the pancreas. In fact, disturbances in the internal secretion of the pancreas do not as a rule lead to infantilism, for in diabetes as it occurs in children there are no accompanying evidences of infantilism in growth or in the general features. There is no retardation in ossification in cases of diabetes occurring in childhood. With the large amount of experimental work which has been done upon the pancreas, such as partial and total extirpation of the gland and the ligation of the ducts with the destruction of the acinar tissue leaving the island tissue intact, there are no instances of direct disturbance of corporeal development. Similarly, there have been no clinical instances reported of retarded development dependent upon diseases of the pancreas other than those cases which can be explained upon a basis of nutritional disturbance in which the alimentary factor is the predominant one.

ADRENAL

The developmental disturbances dependent upon damage to the adrenal in childhood have been too little investigated to allow of a clear differentiation from the true dystrophic types of infantilism. Hypoplasia of the chromaffin tissue appears not to lead to true infantilism. It is possible, indeed probable that such cases of this nature belong to the so-called hypoplastic types of

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Bartel or to true status thymicolymphaticus. Falta cites instances in the literature of hypoplasia of the chromaffin tissue combined with the narrowing of the vascular system, hypoplasia of the genitalia, status thymicolymphaticus and hyperplasia of the thymus gland. According to Wiesel such individuals are particularly predisposed to Addison's disease. Acute destruction of the adrenals can occur as a result of hemorrhage, of thrombosis of the adrenal veins or of suppuration. Simple atrophy or sclerosis is, however, more common. The frequency of tuberculosis of the adrenals in Addison's disease should be mentioned. It is worthy of note that in infectious diseases and intoxications the adrenals are very often involved. Diphtheria toxin has a particular affinity for the adrenal. Edema, necrosis and hemorrhages of the adrenals may occur in the infectious diseases. In many cases it seems that an insufficiency of the adrenal apparatus, and particularly of the chromaffin tissue generally leads to cardiac insufficiency. A case of v. Recklinghausen quoted by Falta is reported, in which a very chronic tuberculous caseation of both adrenals was found in an eighteen year old dwarf who had died in convulsions. Falta would regard the tuberculous involvement of the adrenal in this case as an accidental complication, and not responsible for the dwarfism.

In cases of adenoma of the cortical portion of the adrenal in which such hyperplasia has taken place in youth, abnormally rapid growth of the organism is described. There are to be found in addition premature development of the secondary sex characteristics and of the genitalia, and in adults an abnormally abundant growth of hair. As a consequence, it would appear that in those cases in which the opposite appearances are found, we are probably dealing with an insufficiency of the adrenal cortex. If this grave anomaly, dwarfism, were the result of adrenal insufficiency, we would have to regard it as an insufficiency of the cortex alone which would hardly be probable because we know that hypoplasia of the chromaffin tissue itself tends to the development of asthenic individuals of considerable stature, however. In brief, then, in the consideration of the cases of maldevelopment which have been attributed to the deficient function of the adrenal cortex, it would seem that a relationship has not been proved. It seems, however, from the evidence at hand, that the adrenal cortex has a definitely stimulating influence upon the genital sphere and particularly upon the hairy development, a conception which as we shall see, receives considerable support from appearances resulting from hypoplasia of the adrenal cortex. Thus, for example, tumors of the adrenal are stated to be frequently associated with adrenal overfunction. The latter has been assumed because of the fact that there is in some of these tumors an increased adrenalin content. As a result of the overfunction in cortical tumors of the adrenal in children, we find an enormously increased development of the body and premature development of the genitalia. These overfunctioning cortical tumors are probably in most cases adenomata and hypernephromata. Puberty may appear considerably earlier than normal. A careful review of the literature is found in the article of Neurath (Über Fettkinder). Two representative cases as quoted by Falta

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may be given. The first case of Linser is that of a boy five and one-half years old, who gave the appearance of a youth and for that reason was admitted to the men's ward in the hospital. He was 138 cm. in height, the penis measured 8-9 cm. in length, the testes were pigeon egg in size, and the prostate was of the size found at 15 years of age. The body was adipose, the musculature was very well developed, the stature large and ossification almost complete. Dentition corresponded entirely to that of a boy of 15 years of age. The length of the trunk was greater than that of the lower extremities. The childish measurements were thus preserved in accentuated form. The hypophysis was normal.

A second case of Bullock and Sequeira is reported of a girl eleven years old, who appeared like a woman of forty. At the age of nine and three-quarter years menstruation appeared and from this time onward increasing adiposity became noticeable. The girl was four feet six inches in height, weight eighty-seven pounds, the breasts were fully developed, and the hair of the pubis and genitals was long and present in abundance. At autopsy a large tumor of the left adrenal was found consisting of cells of the zona reticulata together with numerous metastases. There were also found hyperplasia of the thyroid and parathyroid, a completely developed uterus and large ovaries with corpora lutea of recent development. The striking features of the clinical pictures in these cases, as indicated by Neurath, are the premature and excessive development of the genitalia and of the secondary sex characters. Furthermore, in all cases there is adiposity, increased growth of body often with persistence of the infantile measurements and accelerated ossification and dentition. The mental development of these children usually does not progress equally with that of the body development, and the acquirement of the sexual function is retarded.

SEX GLANDS.—EUNUCHOIDISM

Cases of eunuchoidism are not at all rare. Tandler and Gross have adopted the term eunuchoid, which was first used by the English authors, because it is the one most generally used and because it emphasizes the similarity of this condition with the true type of eunuch. Two types of eunuchoids are distinguished, the first characterized by the eunuchoid growth in height and the eunuchoid disproportion of body which are produced by the increased growth in length of the extremities, both of the arms and the legs. We find also signs of skeletal underdevelopment or immaturity in the open epiphyses which may remain so for years after the normal time of closure. In addition a definite saddle nose, together with alterations of the pelvis and genu valgum are not infrequently found. At times the total length of such an individual is not in excess of the average, in fact, it may be below this in spite of the increased growth of arms and legs. In such cases the disproportion of the body mentioned above remains as the sign diagnostic of the eunuchoid type of stature. This disproportion also distinguishes the eunuchoid type from the infantile in so far as infantilism implies the persistence of the childish corporeal proportions. The second type of eunuchoid·

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ism is characterized particularly by the eunuchoid adiposity. The skeletal disproportion, the open epiphyses, the changes in the pelvis, genu valgum and in addition the characteristic adiposity, particularly as to form and localization, are present here. Just as in the type of the castrated individual so here the deposit of fat is particularly marked on the hips, in the eyelids, in the mammary glands, in the lower abdominal regions, at the cristæ iliacæ and over the nates. The skin changes (geroderma) and the distribution of the hair correspond to those found in the eunuch. The external genitalia are small, the testes are underdeveloped, the seminal vesicles may be altogether absent and the prostate is small. Microscopic examination shows often marked retrogressive changes or even entire absence of spermatogenetic development. The epididymis may be large in comparison with the body; the testes are often composed of thick walled tubules with small lumina. The prostate is mostly fibrous, the glandular substance being slight in amount. In fact the entire genital apparatus fails to develop. The interstitial cells may be entirely absent as shown by postmortem examination.

The underdevelopment of the sex characters is indicated by the hypoplasia of the genitals, by absence of the crines pubis and by the relatively deficient deposit of fat in the lower abdominal regions and over the nates. The amount of fat accumulation is not the important thing, it is rather its localization as indicated above which is characteristic. Underdevelopment of the mammary glands is also found. Menstrual disturbance in the older women is a common finding.

The somatic peculiarities of eunuchoid individuals in general correspond to those of the castrated individual and are distinguished merely in the degree of their development, thus we find not only underfunction of the sex glands as shown in absence of sex characters but also changes characteristic of somatic underdevelopment or immaturity, such as persistence of the thymus, open epiphyses and disturbances in metabolism like those found in eunuchoid adiposity. If the underfunction of the sex glands develops slowly and gradually, the changes produced are much more varied in eunuchoidism than in the conditions found after castration. In eunuchoidism we are concerned chiefly with a congenital underdevelopment of the sex glands as a result of which changes are produced which resemble those in early castration. The cases of early damage to the sex glands must be distinguished from those in which the damage to the sex glands occurs after puberty, as a result of infectious diseases, such as parotitis, typhus, tuberculosis and lues. In these changes analogous to those occurring after late castration are seen.

Certain other bodily characteristics have been found to be associated with disturbances in other ductless glands, and may resemble those depending upon sex gland disturbance. It is highly probable that in these cases the sex glands are in many ways complimentary, a relationship we know to exist between the hypophysis and the sex glands. We know that there are two secretions of the sex glands, one derived from the gametes which is intended for the generative function and the other derived from the interstitial tissue which furnishes the internal secretion or hormone which in turn has a very

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definite influence upon the development of the body as a whole and upon its various organs, according as to whether this secretion is increased or diminished in amount or altered in character.

The prognosis and treatment in those types depending upon diseases or disturbances in the realm of the glands of internal secretion is in many instances more favorable, particularly if the primary disturbance, such as tumor of a certain gland, has been removed and the symptoms of deficient glandular activity are counteracted by glandular feeding. This is particularly true of those cases of pituitary infantilism in which tumor of the gland or of its neighborhood has been surgically removed and in which subsequent feeding of pituitary extracts has been instituted. The good results obtained by the feeding of thyroid extracts in case of thyroid deficiency need only be mentioned. With the discoveries of the active principle of the ductless glands, it is probable that better results can be obtained by hypodermic injections of these active principles in suitable cases. At the present time the dosage of the gland extracts or of their active principles is still upon an empirical basis and treatment must be guided by experience and by results obtained.

Glandular transplantations have offered little hope of benefiting conditions of ductless gland deficiency, for they have been practically uniformly unsuccessful. Experimentally, autotransplants have "taken" very well indeed, but in clinical conditions of glandular underactivity it is obviously impossible to obtain a graft suitable for transplantation. A mixed opotherapy, as recommended particularly by the French has been attended by some success, in cases exhibiting pluriglandular symptoms. Combinations such as a mixture of thyroid and pituitary extracts or pituitary and ovarian extracts have been used and improvement reported. In the cases with organic ductless gland lesions of a surgical nature, operative measures are naturally indicated with subsequent administrations of gland extract.

To summarize then we may say that by the term infantilism we mean the cessation or retardation of development in which the corporeal, morphologic characteristics appertaining to infancy or childhood persist beyond the ages at which they are normally found. There are two large groups and a possible third group of cases of infantilism, namely, those belonging to the group of true dystrophic infantilism, those dependent upon primary disease of one or more of the ductless glands and those classed under partial infantilism. In the true dystrophic type of infantilism, there is a more or less uniform cessation or retardation of development dependent upon a general damaging influence on all the organs and tissues of the organism, of toxic or disease origin and arising either in intrauterine life or in early infancy or childhood. There may be a psychic infantilism combined with the corporeal type. In other cases of this dystrophic type the etiologic factors are entirely unknown.

A second large group of cases belong to the type of infantilism caused by primary disease of one or more of the ductless glands. This type illustrates so well how important for the growth and development of the organism is the proper functioning of all the ductless glands. With the disturbance in one

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there are secondary disturbances in the other glands. There is, however, a characteristic stamp upon the disease syndrome produced by the gland primarily and principally involved and this permits of a proper diagnosis and aids greatly in instituting proper therapy. There are many instances in which the ductless glands are certainly involved, in which cases however the disease syndrome is not characteristic of a primary affection of a single gland and to which the term pluriglandular disease is applied. Finally, instances of partial infantilism are described in which individual organs, tissues or systems are more directly affected and the organism as a whole being relatively little retarded in its development.

IDEALISM AND ORTHODONTIA*

By Milo Hellman, D.D.S., New York City, N. Y.

LIFE at times appears somewhat paradoxical. This is realized when in the drifting currents of events we are suddenly confronted by an unexpected turn in their course. In shaping the destinies for ourselves, our goal is set and we are usually so impressed by our convictions that little room is left for doubt as to a probability of any other interpretation. Experience, however, teaches us differently. It is the opinion about us that determines the attitude we assume. That is, we are only what others think we are, and not what we aim to be. When Dr. Eby approached me with the request of addressing you this evening on the topic of Idealism, I was somewhat surprised. And for the moment I was really at a loss. Of all things on earth I never thought that I was an idealist. But on reflection it occurred to me that had he not thought me one he surely would not have made the choice. I thereupon consented. I did that with one reservation in mind, and that was, since this must come to a decision, I shall first have to state my views. Your unbiased opinion may then enable you to render a just verdict.

Idealism and orthodontia have been so closely and so continuously associated that it has become a tradition. At one time it was difficult to distinguish them. We did not know whether idealism in dentistry meant orthodontia or orthodontia, idealism. One fact must be acknowledged and that is that orthodontia owes much to idealism, and that the greatest idealist, in the estimation of all Angle graduates, is Edward H. Angle. None will refute the fact that due to his influence orthodontia stands today as a separate and distinct specialty. He *was* an idealist. And like all other idealists he had a *vision.* And in that vision he foresaw the possibilities of orthodontia. But to realize them, they had to be converted into facts. For instance, a school for the education of a specialist was necessary. He bent all efforts to realize it. When this was an accomplished fact, the necessity for a society was evi-

*One of three twenty-minute addresses given before the First Meeting of the New York Society of Orthodontists, Dec. 8, 1921.

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dent. This was organized and as a monument to his efforts the American Society of Orthodontists stands today as the largest organization of orthodontists in the world. The next necessity was a journal. And as a result the first journal of orthodontia, "The American Orthodontist," was issued. As you are gathered here this evening for the purpose of organization it is proper for me to mention these facts and give credit to him who by his *idealism* made such progress a reality. It must, therefore, be admitted that orthodontia owes a debt of gratitude to the idealism of Edward H. Angle for its origin and culmination as a specialty.

Most, if not all, of his students mention with gratitude the high ideals that Angle instilled into them. These ideals, they maintain, are the background of orthodontic progress and constitute the stimulus for the ambition of uplifting and upholding the exalted position and the dignity of their specialty. While it is evident and must be admitted that the idealism of Angle was a necessary and an important factor in the realization of his "vision" it is rather ambiguous to conceive its application in the present status of orthodontia. Upon careful reflection it would appear that the word *idealism* has lost its original meaning and has reached the stage of a *catch-word.* Let us, for instance, examine what is really meant by it. *Ideal,* used as an adjective is a statement consisting of, pertaining to, or characterized by, or existing in ideas. It is therefore conceptional or mental. It describes something that is conceived as perfect, supremely excellent, or very desirable; as, ideal conduct; an ideal home. It is, therefore, visionary, fanciful and imaginary, and is apparently opposed to the real. For instance, we speak of an ideal commonwealth, ideal happiness. In art it is used to express something that exceeds ordinary reality, freed from commonplaceness or grossness, refined and imaginative; as, an ideal portrait; an ideal form. Can we in this sense also say ideal orthodontia? If we can, what does it imply?

As a noun *ideal* represents a product of thought and imagination, to which any corresponding real existence is not necessarily attributed, but which appears in consciousness as an object worthy of contemplation or aspiration. For example to the American, Washington is the ideal of a patriot; to me, Theodore Roosevelt is the ideal of an American; to the artist, Venus de Milo is an ideal of grace. It thus appears as a conception which exists only in imagination, fancy or idea,—a conception beyond realization; as the perfect circle is an ideal only. Therefore, it may be assumed that *ideal orthodontia* cannot exist.

Idealism (in philosophy) is that system of reflective thinking which would interpret and explain the entire universe, things and minds and their relations, as the realization of a system of ideas, or as the progressive evolution of an ideal. It takes various forms as determined by the view of what the idea or ideal is, and how we become sure of it.

Idealism is customarily regarded as, and in particulars often is, the antithesis of *realism;* but the extremes of each are obliged, while denying many, to admit not a few of the claims of the other. Thus, agnosticism, for example, admits the possibility of reality as independent consciousness, it nevertheless

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denies of knowing such reality. Idealism, therefore, differs from agnosticism by refusing even to admit the possibility of a nonideal reality.

Idealism may also be said to consist in the quest of the ideal; the habit of forming ideals and of striving after their realization; i.e., the attainment of an ideal. This is the only sense in which it may be applied in orthodontia. But, if thus applied, in what frequency has it been found to be realizable? At this stage we inadvertently are confronted with the fact of *realism*. Because, the ultimate end of orthodontia consists in what it actually accomplishes. It matters little as to what we think of its possibilities we must eventually substantiate our contention by results,—the realizations of our hopes and endeavors. Thus, for instance *realism*, in art and literature, strives to portray things with scientific accuracy and detail, allowing comparatively restricted play for the imaginative faculty. Idealism, on the contrary creates from the imagination a type of beauty in conformity with a preconceived ideal. Idealism will thus be seen to cover a wide range in the field of art, from the work of pure imagination, in which no attempt is made to conform to facts to the representation of reality with only a slight tinge of modifying color, introduced to emphasize certain features or aspects of the work.

From this it will be evident that the very inception of an art is closely related to idealism. Healing was originally an art and in its early history teems with idealisms. Thus, the early healers were obsessed with the idea of the attainment of such complete control of the knowledge pertaining to life as to be able to create it. The recent production upon the screen of the "Golem" portrays this attitude. The idea conveyed therein is not a purely fanciful modern conception, it is based on many traditional and recorded anecdotes, fables and tales. Orthodontia, the most recent branch of the healing art, is as yet still striving for the attainment of the ideal. The very foundation upon which orthodontia is built is still conceived as an ideal. Thus, it is said that normal occlusion is the basis of orthodontia. Normal occlusion is the ideal which every orthodontist is striving to attain. The *means*, or mechanism, with which this may be realized consists in an ideal appliance, the perfection of which though progressing with varied success has as yet not been accomplished. The stoicism of the conscientious and thorough orthodontist in his trials and tribulations, his persistency and perseverance in the treatment of malocclusion is the characterization of an ideal determination. It would seem, therefore, that idealism in orthodontia was essential in starting things agoing. Is it essential now? Must it ever remain unchanged? Can it be realized in its original conception?

Orthodontia in recent years has made its way from the speculative, imaginative and subjective realm into that of scientific reality. That is it has come down from the pedestal of idealism and invaded the realm of fact. From the sphere of imagination it has descended or rather *risen* to the domain of understanding. We are beginning now to understand. For example, normal occlusion was hitherto pictured as an ideal. No one could approach it. About a year ago I had the privilege of proving it to be a demonstrable fact subject to scientific investigation and realizable by all. This fact which may be tested

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and verified, while still remaining the ideal of the orthodontist is, nevertheless, changed in its aspect. Namely, instead of appearing as a personification of unimpeachable perfection, it looms up as a biologic phenomenon and is variable in its manifestation. Thereby, the attainment of this ideal in orthodontia is made more hopeful, because it is realizable.

The conditions underlying the possibility of attaining it also changed. At one time, it was deemed that the possession of the ideal mechanism will yield the normal in occlusion, and that in every instance. The ideal in mechanics is a visionary illusion. The nearer we seem to get to it the further it recedes. Experience has taught that the normal in occlusion is obtainable. But, it is obtainable not in exactly the same measure, and not in the same manner. Besides a perfect mechanism, knowledge, ability and skill are paramount. It is the man behind that counts more than the appliance.

The classic ideas about the causes of malocclusion have recently also experienced a jolt. We are in this respect also beginning to realize that most of the formerly propounded causes were really imaginative. They fail to stand the test. As shown in a paper read by me at the last meeting of the American Society of Orthodontists, most of the accepted causes prove negative when examined by the more scientific methods of today.

It is therefore necessary at present to have a clear understanding of this shift in the meaning of some words, words which originally meant something different than they do now. *Ideals* and *visions* as we understand them now were an essential at the stage of inception of orthodontia. Orthodontia however, has not only evolved, it has also developed and grown. Today high professional principles, keen observation, collection of data, classification of facts and interpretation of their significance are more conducive to the elevation and progress of this specialty than *ideals* and *visions*. High principles will help considerably in maintaining the dignity of a profession. These can be cultivated by association. This body, I am in hope will be organized for such a purpose, exclusively. Observation helps to see facts as they are. But for them to be of value it is necessary that they should be recorded. Then, by study of an adequate accumulation of facts, their meaning may be interpreted. From them certain truths are learned. And when an adequate range of truths have been thoroughly assimilated, we are in a better position to think more judiciously and cultivate a better appreciation of the various phases of orthodontia as we are confronting them in our daily experiences. This is the scientific method of procedure. For science is nothing more than tested and verified truth. Moreover, this is my belief and to this standard I aim to live up. If you would call this idealism, then I am an idealist of the highest order. I call it *devotion* to exalted principles. And *discipline* to execute them. The only way I could reconcile *idealism* with the *realism* in modern orthodontia is by substituting the meaning of certain words with that of others.

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Thus, Let *idealism* mean *high principles,* because these are essential for the dignity of orthodontia.

Let *vision* mean *observation,* because this is the eye of intellect.

Let *imagination* mean *actual facts,* because we must face them at all times.

Let *belief* mean *ignorance,* because when we don't know we are easily led to believe.

Let *fancy* mean *error,* because it is necessary to admit it when we are wrong.

By a foundation of orthodontia on the basis of high principles backed by discipline, observation of actual facts, admitting ignorance and eliminating error, distinctions will be cultivated that must tend to a higher knowledge and better understanding. In this manner the profession will be vested with power and influence that none can rival. This power in turn being for the good of all will surely earn the admiration, esteem and respect of humanity. Let us then organize if this be the way to the goal, and by a united effort realize the *idealism* of the founders of this specialty and by our conduct aim to *idealize* our own *realizations.*

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Under Editorial Supervision of
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THE IMPACTED MANDIBULAR THIRD MOLAR*

By Val H. Frederich, D.D.S., St. Louis, Mo.

DENTISTRY today is engaged in an effort to solve the many perplexing questions confronting it. Of the numerous complicated problems before us, probably none is more important or more difficult of solution than that of the impacted mandibular third molar. The pathologic significance and treatment of other infected and impacted teeth are identical with those of the mandibular third molar, so what is said at this time applies equally to all. The watchword in dentistry today as in medicine is prevention. In the past we have relied entirely too much on symptoms, permitting disease to progress until real damage was done rather than anticipating the damage and treating the cause in time to prevent subsequent difficulty. The writer makes no claim of originality but is presenting the evidence as he has found it in actual practice coupled with a study of the thoughts of others.

The rôle that impacted, unerupted or infected teeth play in the production of lesions about the jaws, brain, nervous system, the circulatory and respiratory systems and in fact the entire physical economy has long been recognized. There is nothing new about this, but as in many other instances we have permitted our knowledge to lie dormant until perhaps some casual happening has aroused it. Many years ago our foremost educators taught us that damage was being done by faulty eruption of teeth; and it behooves us, therefore, that we take these teeth into consideration in making a diagnosis of obscure lesions wherever found. This is equally true for the physician, as only too often does one find a patient being treated for a serious malady whose mouth is reeking with filth.

ETIOLOGY

Of the different impactions, the mandibular third is the most frequent, the canines come next and then follow the maxillary third and the premolars

*Read before the St. Louis Dental Society, March 6, 1922.

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and molars. There have been many theories advanced as to the etiology of impacted teeth. Abnormal embryonic development is a probable cause, especially in those cases where the impacted tooth has taken an inverted position or perhaps a lateral position. In these cases the tooth bud was probably displaced in embryonic life and continued its development, erupting abnormally or not erupting at all.

Malnutrition, syphilis, rickets and cretinism have a decided influence toward impactions, since they have a direct bearing on the bony growth. Eruptive fevers is given as a cause by some as also is artificial feeding.

Inflammatory conditions of the bone or the peridental membrane brought about by caries or severe orthodontic procedure is a probable cause. In this case the cancellous tissue instead of remaining soft and more or less elastic becomes hard and unyielding, due perhaps to a secondary deposit of dense bone in the cancellous structure. This would necessarily tend to retard eruption, if not prevent it altogether, or cause the tooth to erupt in malposition.

The premature loss of the deciduous teeth causing a contraction of the dental arch seems to be rather a prolific cause. In this instance the third molar, erupting rather late in life, would be compelled to utilize what little space was left if any and an impaction would again be the consequence.

There are many other causes given by various writers on the subject such as: perversions, neurosis, anemia, scurvy, idiotism, severe traumatism to the jaws causing a deposition of lime salts in the cancellous tissue, retarded eruption of the deciduous teeth causing abnormal density of the cancellous tissue, etc. No doubt there is a certain amount of logic for each.

While the preceding etiologic factors are accepted generally by scientific men as being correct, nevertheless, the idea of evolution has always had a strong following. There can be no question but that the human being is losing ground physically, argued from the standpoint of primitive man. It does seem that at one time all the teeth were useful and even necessary. With our present day methods of cooking and eating this is at least a debatable point and nature is possibly throwing off an organ that is no longer useful or necessary. The change is noticeable even in our own time, say the last twenty-five or fifty years. Many of you will remember perhaps the neighborhood butcher preparing fresh meats for immediate consumption. At the present time with the large packers preparing the meats, we must have meats that are aged for six months or a year so that it is so tender that a fork will suffice to pinch off a piece. This for fear that we might be compelled to use our teeth and jaws as nature intended us to do. We all know very well that a human organ that gets no natural stimulation through proper use undergoes atrophy. Darwin mentions this matter of the degeneracy of the teeth in his book on "The Descent of Man." He says that it appears as if the wisdom teeth are becoming rudimentary in the more civilized races of man. He also makes the same observation regarding these teeth in the chimpanzee and the orang, attributing the changes to the soft foods of civilized man and the reduced use of his teeth and jaws.

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PATHOLOGIC SIGNIFICANCE

An impacted tooth gives rise to certain pathological phenomena. Perhaps the simplest of these is the local inflammation of the soft tissue or gum surrounding the tooth. This is brought about by an overlap of the soft tissue, which normally should be distal to the third molar, becoming traumatized in the process of mastication. Food particles and bacteria find lodgment under this loose flap of gum tissue and infection readily takes place. The inflammation frequently extends over a large area invading the muscles of the cheek and often the tonsillar, parotid and submaxillary regions, resulting in a trismus of pronounced severity at times and very often most agonizing pains. The pain may be constant or experienced only when opening the mouth. Infection may follow in the tissues of the tongue and floor of the mouth causing symptoms identical with Ludwig's angina and thus endanger the life of the patient. The infection once started may gain access to the lymphatics of the neck and lead to general septicemia, pyemia or other complications, when the recovery would be extremely doubtful depending on the resistance of the patient and other factors governing such affections. These severe attacks often follow a series of milder ones, which sometimes yield on their own account or with mild irrigations and the application of iodine. The excision of the superimposed gum flap is poor practice in the opinion of the writer as it seldom does any good and often makes matters worse.

The proper surgical procedure is the removal of the tooth. Many operators feel that the removal of the tooth should not be resorted to in the acute stages, and while this objection has some merit, nevertheless in the majority of cases it is based on needless fear. If the inflammation has localized at all, the best and most satisfactory procedure is extraction. However, it is not always safe to extract in the acute stages and here the judgment of the operator needs to be well balanced. There will be plenty of clinical evidence to guide him. The patient will show some temperature, the eyes take on a peculiar appearance, somewhat glassy, the face may be flushed but more often assumes a pale and pasty look, the edematous gum tissue will be red and dry, there might be an involvement of the lymph glands in the submaxillary region and in a general way the patient will present a picture of sepsis. In these cases, if the symptoms warrent, it will likely be best to put your patient to bed for a few days, employing prophylactic measures in the mouth such as irrigating around the tooth and under the superimposed gum flap, employing counterirritants thoroughly over the inflamed area, perhaps using a cold pack and keeping the organs of elimination active. In a few days the patient should be well enough to proceed with the removal of the tooth.

If the operation must be done at once and if the inflammation is very extensive, especially to the distal, a general anesthetic should be employed. To use a local or a conduction anesthesia in these highly inflammatory cases is not without danger on account of the possibility of forcing some of the infection into the deeper tissues causing added complications.

Another pathologic condition which we find as the result of impacted

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teeth is abrasion of the second molar. The enamel of the crown of the third molar, pressing against the softer structure of the roots of the second molar, will cause an abrasion or cavity of more or less magnitude. This abrasion may be sufficient to cause continued irritation of the second molar pulp or even cause the death of it. Caries often follow the abrasion and an abscess is the result. It can readily be seen that marked nervous disturbances and neuralgia might be suffered from this irritation of the pulp by means of a referred or reflex action. The writer has seen abrasions of this variety extending into the pulp chamber of the antagonizing second molar.

The impacted tooth might cause a very severe condition by direct irritation and direct pressure against the inferior dental nerve. In cases where the root ends had not yet completely developed, the sharp edges might bear against the pulp tissue itself causing intense irritation. This is given by some authors as being a factor in chorea, epilepsy and other neurotic tendencies. There seems to be plenty of evidence showing that certain forms of insanity, hysteria, melancholia, insomnia, etc., owe their origin to impacted teeth. There may be no pain in the tooth itself at any time, but the long-continued, constant irritation seems to be sufficient to produce the serious effects described. The late Dr. Henry S. Upson laid great stress on impacted teeth as an etiological factor in nervous afflictions.

Dermatologists believe that there is some connection between partial baldness (so-called alopecia areata) and impacted teeth. They state that this condition is due to some form of irritation of the fifth nerve, which makes it quite possible that impacted teeth form the basis. It is claimed that in the University of Michigan, the departments of Oral Surgery and Dermatology have, within the last two years, observed the recovery of ten cases of alopecia areata after the removal of the impacted teeth.

Impacted teeth will frequently crowd the dental arches to such an extent, as to cause marked irregularities in the alignment, manifested mostly in the canine and premolar regions.

It is not infrequently found that impacted teeth will lie dormant until very late in life and then give rise to the formation of abscesses or cysts. The writer personally knows of three cases of apparent lesions in the mouth that were diagnosed by prominent men as cancer. The error of diagnosis was not disclosed until operation was resorted to, when it was found that an impacted tooth had caused the breaking down of the tissues, leaving a ragged opening that much simulated a malignant growth. Two of these cases occurred before dental radiography became popular, and in the third case the writer discovered the error himself, the patient being a personal friend. The ages of the patients referred to were over 60 and 70 years.

TECHNIC OF REMOVAL

The technic for the removal of the impacted mandibular third molar will depend upon the difficulty anticipated, and the difficulty is in direct ratio to the degree of impaction. It is probably correct and fair to say that the great majority of impacted third molars present but little difficulty, to one

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experienced in tooth removal, however much they may seem a bugaboo to the uninitiated. The fact is that the simpler forms of impacted third molars offer far less difficulty than a firm first or second molar if the operator is well versed in the use of elevators. No absolute method or technic can be laid down for the removal of these teeth because no two are exactly alike, neither is the condition of the supporting osseous structure always the same. We can speak of general principles only so far as technic is concerned. Then, too, the personal equation enters, and what might be advantageous for one man may be simply useless to another.

SIMPLE IMPACTIONS

For the removal of the simpler forms of impactions the writer prefers the use of nitrous oxide and oxygen as an anesthetic. By simpler forms of impactions it is intended to include all those in which the impacted tooth, inclining toward the mesial, impinges on the distal surface of the second molar, not below what would be the middle point between the occlusal surface and the gingiva; also those standing in a fairly vertical position but somewhat depressed and perhaps covered completely with soft tissue. A good radiograph is a primary requisite. None but the simplest cases should be attempted without one and then it is not always safe. The modus operandi to be followed should be studied from the radiograph plus the oral cavity itself and well fixed in the mind of the operator. The field of operation should be sterilized as to gross sepsis and all other surgical precautions should be exercised throughout the entire operation. Anesthesia is induced, the jaws propped apart sufficiently, and gauze sponges placed posteriorly so that nothing can drop down the trachea or the esophagus. At this time, if it is deemed necessary, an incision is made through the superimposed gum tissue straight back along the upper surface, with either a sharp gum scissors or a scalpel. For those partially covered with soft tissue a sharp gum scissors is generally preferred, while for those completely covered a scalpel is used. The elevator is now inserted at the mesio-buccal corner of the third molar and is directed downward and to the lingual, finally occupying a position on the mesial surface of the impacted tooth as far down toward the apex as possible. A prying motion is now used to dislodge the tooth forcing the tooth backward and upward out of its socket. Any elevator might be used that suits the fancy of the operator. There are a number of makes on the market. It is not necessary to insist upon the complete removal of the tooth with the elevator. The writer often uses a forceps to pick the tooth out of its socket after the elevator has thoroughly dislodged it. Impactions of this class lend themselves readily to rapid and spectacular operations.

COMPLICATED OR DIFFICULT IMPACTIONS

The technic for the removal of the more difficult and complicated impactions is quite a different matter, and one that taxes the ingenuity and skill of the operator to the utmost. For this class the writer employs conduction anesthesia entirely, unless forced by stress of circumstances to do otherwise. The reason is obvious. With this method of anesthesia there is ample time

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for the worst case, complete freedom from pain, reduced hemorrhage, ready cooperation of the patient, less strain on the operator, less fear for the safety of the patient as regards the anesthetic, opportunity to keep the field of operation free from bacteria laden saliva, and the possibility is presented of keeping the landmarks of the operation clearly before you so that the tissues may be traumatized to a minimum.

Here again it is necessary to have a good radiogram and study it sufficiently so that the surgical procedure can be outlined in advance, although conduction anesthesia permits of much latitude in this instance. The field of operation is prepared as described previously and sterile gauze rolls or sponges are placed on the lingual under the tongue to take up the fluids. These are replaced as often as required. An incision is made through the mucoperiosteum about three-fourths of an inch long, extending posteriorly along the upper surface of the alveolar process covering the tooth, and close to the lingual. This incision is then carried buccally for about one-fourth of an inch. Another incision is now made in a vertical direction about one-eighth of an inch to the distal of the second molar and carried somewhat mesially to give room for approach with the chisel and elevator. This incision is carried down to a point about midway between the gingiva and the apex of the second molar. The reason for starting this vertical incision one-eighth of an inch to the distal of the second molar is to protect the gingiva of this tooth, although if the impaction be bearing hard against the distal root of the second molar and be lying horizontally it might be best to start the vertical incision at about the posterior third of the second molar. This flap is then lifted from the osseous tissue below with a periosteal elevator or a chisel. At this time the process covering the impaction on its upper surface is removed with a chisel and mallet to a sufficient extent distally to permit the removal of the tooth later, say about five-eighths of an inch. The process on the buccal side of the impacted tooth is next chiseled away freely enough so that the tooth will not bind at this point while prying it up later with an elevator and be forced against the lingual plate and perhaps fracture it. It may be necessary now to cut away some of the process in a tapering fashion toward the apex of the impacted tooth, thus giving all the space needed to partially right same. All the cutting of process is done on the upper surface and on the buccal and absolutely none on the lingual, as the lingual artery and nerve might be injured. In addition to this the patient will be very grateful if the lingual tissues are not disturbed at all. An elevator is now used cautiously at several points to loosen the tooth which after this preparation should be simple. If the process has been thoroughly removed as described there should be no difficulty now in prying the tooth upward and backward out of its socket completing the extraction. Any resistance to removal offered by the tooth at this point indicates simply that the bony impingements have not been sufficiently relieved.

POSTOPERATIVE TREATMENT

The wound is now carefully examined and all spicula of bone removed from the socket and all rough edges smoothed down. The amount of post-

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operative treatment will depend almost entirely upon how neatly the work was done and how much the tissues were traumatized. A warm saline solution or a mild nonirritating antiseptic solution is used to irrigate the wound and socket. The flap is now sutured back in position after a blood clot has been induced. No gauze dressings are used unless there has been a suppurative condition and it is desired to keep the wound open. The patient is instructed to use warm saline solutions for a mouth wash and to look after the elimination. Rest is also very beneficial after an operation of this sort. For postoperative pain the writer has used a combination of aspirin, codeine and caffeine with good results. Aspirin in five or ten grain doses or pyramidon in five grain doses have also given satisfaction. To reduce pain by dressing the wound itself the writer has had best results from the use of novesthene and procaine in solution with some essential oils. A piece of one-half inch ribbon gauze is saturated with this solution and placed in the socket with the most gratifying relief. If preferred, iodoform gauze might be used. Recently the use of analine dyes as disinfectants and tissue stimulants have become somewhat popular. Crystal violet and brilliant green 1 per cent in 50 per cent alcohol is used. Some operators speak very highly of the efficiency of these dyes. As mentioned before, if the operation has been performed with correct technic and in a proper surgical manner, little postoperative treatment will be needed, but if the reverse be true disastrous results may readily follow.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

A RADIOGRAPHIC STUDY OF BONE REGENERATION FOLLOWING APICOECTOMY

By Martin Dewey, D.D.S., M.D., New York City

THE problem of pulpless teeth has been one that has occupied the attention of the dental and medical profession during the last few years, and a large number of operations and technical plans for treating pulpless teeth have been devised by different men. To a certain extent one might divide these various plans of treatment into what can be termed therapeutical and surgical.

Under the head of therapeutical methods, would be included various plans of medication which have for their object the treatment of the pathological condition at the end of the root whereby the tissues are placed in such a state that Nature is able to change a pathological condition to one that is physiological.

It must also be remembered in this classification that surgical means enter into the therapeutical as far as actual treatment of the pulp canal and its filling is concerned. Under the surgical means we may include such methods as recognize a pathological condition at the end of the root and take the view-point that the quickest way to eradicate pathological tissue is removal by surgical methods, allowing Nature to heal or regenerate new tissue after the surgical operation.

The surgical method has many advantages because it is founded upon sane and safe principles which include the removal of all infectious conditions when known to exist. The surgical operation may be apicoectomy, which includes the removal of a portion of the apex of the tooth, or it may, in some instances, consist of simply a removal of the necrotic and pathological bone around the end of the root, leaving the end of the tooth intact. Of course in the surgical treatment of infected areas at the apex of teeth the pulp canal must be surgically clean and filled.

The surgical removal of infected material at the end of the root also including the actual removal of a portion of the root is an operation upon the value of which the dental profession is divided. Men who have developed

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a fine therapeutic plan of treating pulpless teeth are opposed to anythin that resembles surgery. A man who is surgically inclined is also liable t place too much weight upon operative treatment of infected areas. Never theless, if both plans are given their proper and due consideration, I believ in the majority of cases, where the infection is to any degree extensive, tha the surgical procedure offers the patient more relief and more hope of per manent relief than does the therapeutic method. The surgical method i more logical.

I make this statement realizing that men claim the surgical treatmen of infected areas at the end of the teeth is out of "date" and as some say out of "fashion." Nevertheless, surgical principles still exist in the trea ment of pathological conditions.

The other day in conversation with an exodontist, I said that I ha seen many excellent results in the surgical treatment of infected apical area The exodontist replied, "Yes, and I have extracted many of those 'excellen results." He made the statement as if the fact that he had extracted teet upon which apicoectomy had been performed, condemned the operation a a failure. Such an argument is not logical because the undertaker eventuall buries every patient who has had a surgical operation. In fact the unde taker also buries the people that have never had surgical operations. Lik wise one might say that surgery was a failure because the patient eventuall died even though he may have died thirty or forty years after the operatio from an entirely different disease.

Many of these teeth upon which apicoectomy is performed are eventuall extracted because of other pathological conditions; because they are finall extracted does not mean the apicoectomy was a failure. Exodontists extra teeth which have also been treated by therapeutic measures; they also e tract teeth that have had no treatment whatsoever. In fact, the futur of most teeth is that they will be extracted provided the patient lives lon enough. So for any one to say that apicoectomy is a failure because th tooth has been extracted is drawing a conclusion which is by no mean logical and which is entirely unfair to the operation, and if such compariso is going to be taken as a basis we might as well say that all dental oper tions are failures, even to the filling of the cavities because teeth that hav cavities filled and have vital pulps are often extracted some time in the li of the individual.

The surgical treatment of infected areas at the end of pulpless teet is in keeping with the knowledge of modern surgery and pathology and a much safer method of treating many of these conditions than is the ther peutic method in attempting to eliminate all of the infection through th small opening of the pulp canal.

There is another question in regard to the surgical treatment of infecte areas including apicoectomy which has received much discussion; that i the regeneration of bone in the surgically treated area. I can remembe a few years ago when a number of men insisted that the bone never reger erated in those regions. It seems to me that such a statement as that wa

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nly the result of ignorance in regard to physiological development and rowth of bone.

In any region of the body where there is a healthy bony surface that s not in contact with soft tissue, the bone will regenerate and fill that space. Experiments in the development of bone carried on by investigators prove hat healthy bone will regenerate provided activity is not limited by pressure.

After the radiogram became more common and it was possible to make adiographic studies, it was clearly demonstrated that osseous tissue filled in hese spaces from which necrotic tissue had been removed. Then we find a ew word crept into dental nomenclature and men spoke of this new bone as eing "sclerotic." From a histological standpoint it is rather a difficult hing to define "sclerotic bone" but we presume that the men who originated hat term mean that this bone is "scar bone" as distinguished from normal one.

I have never known of a clear and scientific definition of sclerotic bone ased upon histological characteristics. Sclerotic bone is nothing more than ompact bone which is the first type of bone to form in regeneration or bone epair. This bone which forms at the apex of a tooth after a surgical operaion is exactly the same type of bone that would develop on the body of the ong bones if the periosteum was lifted away from the body of the bone and space was allowed to exist between the shaft of the bone and the periosteum. This nodule of bone which would form under the periosteum would have the ame histological characteristics as the bone that developed at the end of the ooth after apicoectomy, and the x-ray would picture it as being denser and nore compact and practically devoid of cancellous structure. The circulation nd nutrition would consist of what could travel into the bone through the analiculus of the bone cell. In other words this nodule of newly formed bone s practically devoid of cancellous formation and medullary spaces which neans no capillaries or circulation exist in it at that time.

This new compact bone is the result of bone cells being thrown into the space from the pre-existing bone and consequently they form a more dense bone than that which has existed a longer period of time and has been absorbed and rebuilt so as to produce the cancellous and medullary forms. The bone which forms at the end of a tooth after a surgical treatment of infection is the same as the new bone that forms at the fractured portions of the long bone and can be easily understood if one has devoted time to the study of a large number of histological sections showing the growth and development of bone in the embryo and bone of various ages and the different manner in which it stains in histological preparations.

It must also be remembered that the very life of all bone consists of constant rebuilding and absorbing in all parts of the body. Bone recently rebuilt is compact bone and shows the same appearance as the so-called "sclerotic" bone. After we have considered this early form of bone in the surgically treated areas which is always dense, it is well to study the further change in this structure. If a series of these cases were studied it would eventually be found that this compact bone disappears and is replaced by cancellous bone

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which has the same appearance as the rest of the alveolar structure. Of course it takes some time for these changes to occur because it takes a considerable period of time for a bone which has been fractured to develop to the point that the line of fracture is not discernible in the radiogram or histological section.

It is rather surprising to some of our friends who are opposed to surgical treatment of pulpless teeth to know the rapidity with which this new bone regenerates and assumes a normal physiological appearance as portrayed by the radiogram.

The following three cases show some interesting features in bone development following apicoectomy. It is needless to go into the various technics

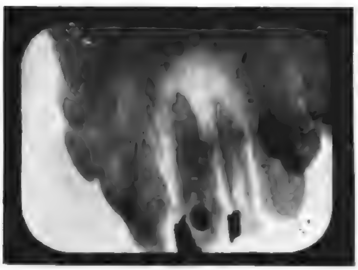

Fig. 1-A.—December 15, 1920.

Fig. 1-B.—December 15, 1920.

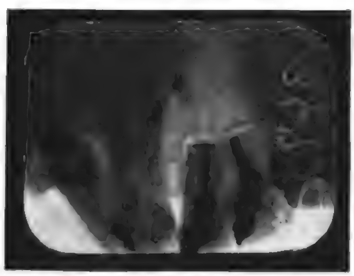

Fig. 1-C.—October 31, 1921.

employed in treating these cases, for I am only analyzing the histological significance of the radiograms as shown in three cases.

Fig. 1 shows a case which on December 15, 1920, presented with pulpless teeth with a considerable infected area at the end of the root. The second picture (*B*) shows the case immediately after operation. It will be seen that a considerable portion of the bone has been removed and that the ends of the roots have been cut off. Fig. 1-*C*, which radiogram was made October 31, shows the bone as regenerated, and it has already assumed a cancellous appearance. If a radiogram of this case had been made four or five weeks after the operation, we would have found that the area from which the necrotic bone had been removed, was filled with a much denser bone than we find on October 31, 1921.

Fig. 1-*C* shows a condition at the end of the root in which a space seems

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to exist between the end of the root of the bone. The future of this space is a matter of more or less discussion, but I do not believe it has any pathological significance and only exists because of the fact that the Human Family has evolved to a point where bone and dentine do not unite the same as they do in some of the lower animals. I believe in many of these conditions there will be a regeneration of cementum over the end of the root from the gradual creeping up of the cemental organ the same as the bark grows over a tree where a portion has been removed.

I saw a histological section in the possession of Dr. Hecker a few years

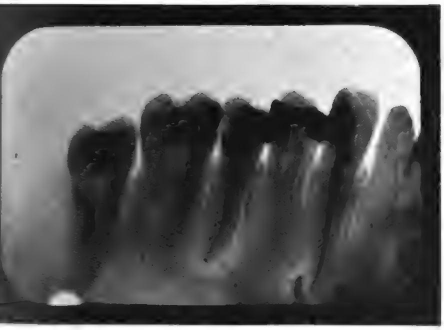

Fig. 2-A.—March 26, 1920.

Fig. 2-B.—March 26, 1920.

Fig. 2-C.—October 15, 1920.

ago which showed an accidental fracture of the end of a root, the same possibly unknown to the patient, in which the cementum had grown over the tooth and root portion which remained in the tissue. How long this fracture existed no one knew, because the specimen was obtained from the dissecting room and no previous clinical history could be obtained, but it proved conclusively that the cementum was a constantly growing tissue which if in a pathological condition would cover dentine such as the end of the root where the dentine has been exposed as a result of the apicoectomy.

Fig. 2 also shows three views. The pictures *A* and *B* are before and after

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the operation. *C* shows the case on October 15, 1920, in which the bone has regenerated and assumed a decided cancellous appearance and which has every indication of being a perfectly physiological bone.

Fig. 3 is also another case in which the first two pictures *A* and *B* are made immediately before and after the operation. Fig. *C* was made on November 17 and shows a regeneration of bone which so far as density and cancellous arrangement is concerned, is normal. The socket of the tooth is also climbing over the edge of the root which would indicate that the cementum is gradually developing around the apex of that tooth and will eventually cover the exposed dentine completely and with the regeneration of a new peridental membrane you will have the same appearance at the end of that tooth that we find in some patients where the roots of the teeth are short and undoubtedly have failed to develop to the proper length. In some instances the bone unquestionably has been absorbed and followed by the regeneration of the cementum and the peridental membrane of that area.

Fig. 3-A.—April 23, 1920.

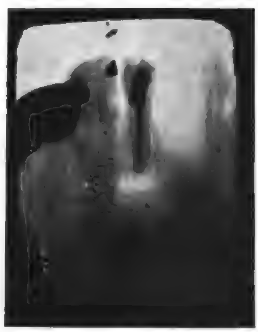

Fig. 3-B.—April 23, 1920.

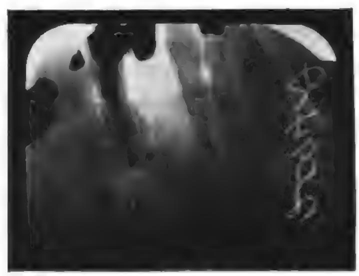

Fig. 3-C.—November 17, 1920.

In speaking of the absorption of the teeth, why this absorption occurs in the permanent teeth we do not know, but it does occur normally in the deciduous teeth and we find a portion of the root may be absorbed and the cementum and dentine removed to a certain depth and later the cementum will be entirely developed over the dentine in that region. Such conditions as that were shown by Dr. Black by his work on the peridental membrane. Specimens made by other men showed the same condition. The radiogram interpreted in the light of modern histology reveals the same in the permanent teeth. I think this absorption in some instances may be produced by improper orthodontic treatment and in other cases it occurs for unknown reasons at the present time. Viewed, then, in the light of modern histology and in keeping with a knowledge of bone development, everything indicates that the surgical treatment of infection at the end of the teeth is perfectly logical and holds out a great degree of success.

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The bone regenerated after surgical operations will show different radio-raphic appearances depending upon the length of time after the operation iat the radiogram is made. Also these various changes in new bone area are ie same as would occur in normally developed bone in any part of the body. : is our opinion that the so-called "sclerotic" bone is only a compact bone iat always develops in any part of the body where the bone cells develop in reat numbers as they do in the space created by surgical treatment of the ifected area at the end of the teeth.

'ECHNIC FOR DENTAL RADIOGRAMS WITH INTRABUCCAL FILMS*

By Nadaud (of Colmas)

THE surgeons and dentists in France seem to avail themselves less and less of the valuable and indispensable information which the systematic use of ie x-ray might furnish them. The radiographic examination of the pathol-gy of the teeth and maxillae is divided into the three following radiographic iethods, which is far from being an objection, as each have their advantages.

1st. External method, with the extraoral plate and projecting on this late each side of the maxillae, separately.

2nd. Internal method or intrabuccal, originally described by Costa and inclair, perfected and named "the method of horizontal projection by Dr. . Belot."

3rd. Internal, intrabuccal method by direct projecting on the films.

In this article, we have especially in view the use of this latest method vhich several of our scholars, such as Jaugeas and Albert-Weil, it seems to is, have either discredited wrongly or have presented as very complicated.)ur purpose here will be to determine the characteristics of a simple and onvenient technic which, without any special appliance, will always furnish is with excellent results and which others, with a few differences, have used vith certainty before us.

TECHNIC

We use x-ray films with a double-emulsion, the films being cut to the lesired size in the dark-room. The sizes we use are 2 cm. by 3 cm. for taking in individual tooth and 4 cm. by 5 cm. for taking several teeth at a time (gen-eral size 3 or 4 cm.).

1. *Packing.*—Each film, as when utilized, is carefully packed in a small rectangular sheet of black opaque paper which is folded two or three times over the film and whose slightly overlapping borders are turned back of the ilm once it is folded. The entire thing is again enveloped in a new rectangle of

*Translated by Margaret Gortikor, D.D.S., from Jour. de Radiologie et d'électrologie, November, 1921.

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very thin parchment paper whose overlapping borders are folded like thos of the black paper in order to protect the film from contact with the saliva

2. *Placing It in Position.*—The patient who is seated on a chair with high vertical back opens his mouth wide and the operator places the film thus prepared, against the lingual surface of the tooth or teeth involved an against the corresponding part of the maxilla. He then holds this film wit his right forefinger if on the right side of the mouth (whether upper o lower maxilla) or with his left index finger if on the left side. With the han that remains free, he so adjusts the film that one of the sides measuring 2 cm if it is for an individual tooth, or if it is for several teeth, then one of th 4 cm. sides should be on a level or pass slightly beyond the occlusal border o the crown or crowns of the tooth or teeth involved. Then it follows that th long axis of the tooth will be parallel to the 3 cm. border of the film. Thi done, the operator places the thumb of the patient in the place of his fore finger (right thumb of the patient for the left side, left thumb of patient fo the right side). It is advised that after the substitution of fingers under con trol of the operator, the entire width of the cushion of the thumb be passe over the film, pressing it firmly over the teeth and the maxilla at the sam time. At the time of substitution, no difficulty will be occasioned if the oper ator takes pains beforehand of explaining to the patient what is expected o him. The operator can accurately demonstrate on himself, using a blank If during the course of substitution the film has become slightly displaced it is right for the operator to gently replace the latter in position. It bein easy to exert pressure, the film is held firmly against the teeth and maxill under these conditions.

Thus it is not necessary to use the special film carried or the bucca stamper made of solidified dental wax for holding the film, both articles bein mentioned by Albert Weil in his book. In our opinion there is a useless com plication without any advantage involved in the use of such articles.

The little "trick" which we have indicated, requires much more time t describe than to execute especially when you are in the habit of doing it.

3. *Direction of the Normal Ray.*—It is indispensable that we provid ourselves with a gauge of the exact incidence which is easily removed an becomes very much mixed up with the normal ray of the x-ray tube previ ously well centered.

(a) *Upper Maxilla.*—The patient, as we have stated above, is seated, hea erect, leaning against the back of the chair, and made stationary by crossin over the forehead a band of cloth whose fag-ends, thrown backward, eac supports a weight of about 1 kilogram. You incline the head in the directio of the sagittal plane so that the line which joins the labial tubercle to th tip of the lobe of the ear be approximately horizontal.

The normal ray of the x-ray tube is at an angle of about 35 to 40 degree and meets the cheek of the patient approximately at the line which joins th upper part of the alae of the nose to the upper part of the tragus (Fig. 1). A point that we should recall is that the upper second molar is almost as hig up as the inferior angle of the molar bone and that the canine generally is a

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high as the labial commissure. The first inclination of the head having been made, the normal ray is directed in a vertical plane, almost perpendicular to the maxilla at the central point of the area to be radiographed.

The points we have just indicated do not require absolute accuracy; after a little practice, you can quickly get to establish these conditions with sufficient exactness by just a glance of the eye, that is, provided your apparatus is easily managed.

(b) *Inferior Maxilla.*—The patient is disposed of in the same manner as for the upper maxilla but, in this case, the normal ray besides being horizontal is likewise located in a vertical plane which is perpendicular to the direction of the maxilla from the point being considered. The ray will meet the cheek in a point located in a line parallel to the one which joins the labial tubercle to the tip of the ear-lobe and being about a finger-breadth distance beneath it.

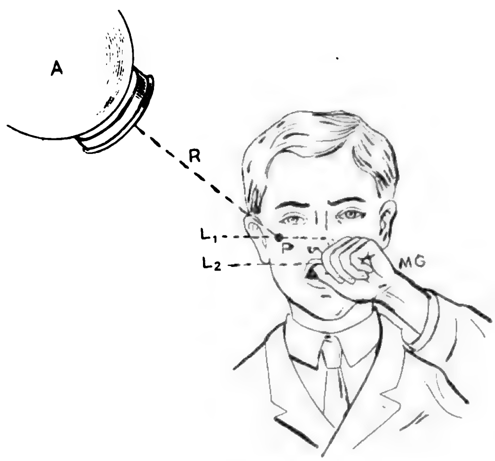

Fig. 1.

Fig. 1.—Taken of the upper teeth on the right side of the mouth. The patient places his left thumb in his mouth and holds the applied film.

A, X-ray tube. *R*, Direction of the normal ray. L_1, Line passing through upper part of the alae of the nose and the upper part of the tragus. L_2. Line passing tubercle of the lip and the tip of the lobe of the ear. *P*, Point where the normal ray meets the line *L*. *M.G.*, Left hand holding the film.

4. *Taking of the Negative.*—With the outfit that we have (Coolidge Standard) we work with 48,000 volts, with 15 milliamperes and the focus-plate at a distance of 60 cm.; our time of exposure is 1½ to 2 seconds for the anterior teeth and the teeth of the lower maxilla and an exposure of 3 to 4 seconds posterior teeth of the upper maxilla.

RESULTS

The negatives obtained by this method, especially those which apply to the radicular and periradicular regions, are very detailed and so good that in our opinion it seems to us these qualities cannot be attained by the two other methods. This becomes apparent when we realize how closely the film is brought to the tooth and root.

Before concluding we would like to refute some of the criticisms on the use of films, which Jaugeas mentions in his book. Speaking on this subject, he says "The adoption of the sensitive and flexible films to the posterior part

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of the dental arches offers many difficulties and besides this method does not permit for the taking of the entire maxilla and does not always picture the tooth with its entire root.

1. We have previously shown with what simplicity, no special outfit being required, one can conveniently and in an unalterable manner adapt the sensitive surface to the posterior part of the dental arches. We will not insist upon it however.

2. Without seeking to oppose, as Jaugeaus does, the two methods mentioned at the beginning of this article, like the author, we also admit that the first two methods allow for the x-raying of a larger area of one-half of the maxilla, at one time. This is one of the principal advantages of these two methods. Furthermore, let us add that Dr. Belots' method provided with its special apparatus is easy to carry, quick and automatic so to speak.

The method we have described has no less of an advantage, being particularly indicated when we wish to x-ray with the best result, a limited region of the maxilla comprising one, two, or three teeth surrounded by their periradicular zones.

Besides, let us say that the use of the intraoral film in general allows for conveniently "tracing" the wisdom tooth, especially if we use a slight

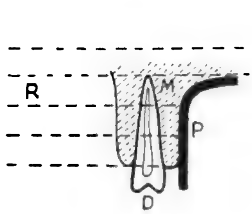

Fig. 2.—Superior maxilla with the horizontal rays, the apical region being focused, proceeding from the film. *R*, rays; *M*, maxilla; *D*, tooth; *P*, film.

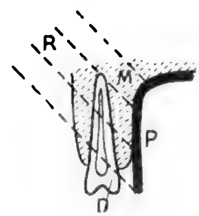

Fig. 3.—Upper maxilla with the rays at an angle of 40°, the apical region is completely focused on the film. *R*, rays; *M*, maxilla; *D*, tooth; *P*, film.

local anesthetic on the lateral portion of the palate for the upper teeth when you have a very nervous patient. Then nothing prevents your taking several radiograms of different limited areas of the same maxilla.

3. By the technic previously described, you always take in the apex of the teeth in the inferior maxilla and from there, the lower border of the film can easily be made to reach to the level of the inferior border of the maxilla if you depress the buccal tissues sufficiently.

The same applies to the upper maxilla because the inclination of the rays at an angle of 35 degrees allows for very easily including the apex of the teeth and the surrounding area. Figs. 2 and 3 will elucidate more clearly than any explanation.

Finally, let us say that this method, no more than the others, does not give the exact size of the roots, and besides, it offers but a mediocre share when it comes to the information generally required by dentists or the stomatologists from the x-ray.

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CONCLUSION

It seems to me that the three methods mentioned at the start of this rticle are not to be compared and that, according to the case to be radio-raphed we ought to give preference to one method or the other or even use ll three simultaneously.

The intraoral plate, placed in the dental arches with the ray at an angle f 45 degrees and the extraoral plate with focusing by dividing the maxilla nto two parts, are indicated when we wish to have an idea of the "whole" nd a detailed description of the serious lesions which spread and involve the eeth and the maxillae; but if we desire the precise and clear details concern-ng hidden and limited lesions radicular and periradicular, we ought by all neans to direct our attention to the process of intrabuccal films.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Eyes, but We See Not

Q.—If the x-ray does not lie, what is your explanation for this instance? In this case there was a discharging sinus directly over the second premolar, which was sore and showed an absorbed root in the picture. I opened the tooth and found a vital pulp, which I removed. I then noticed a slight rarefaction around the mesio-buccal root of the first molar, and after failing to get through the canal, extracted the tooth. The sinus continued to discharge, so I opened the first premolar on suspicion and found the cause of the trouble. Is this experience not enough to destroy my confidence in the x-ray?

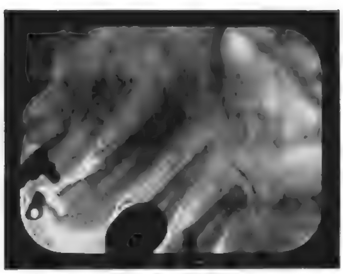

Fig. 1.

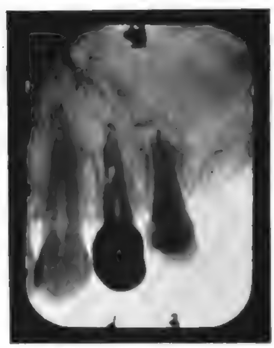

Fig. 2.

A.—No, this experience might destroy your self-confidence or the patient's confidence in your ability, but it should strengthen every one's confidence in the truth of x-ray evidence. The error was in the interpretation and application, not the evidence. You made so many mistakes that they must be reviewed in order.

First. Your radiographic examination was inadequate and technically imperfect. If you had projected the structures accurately upon the films or even made more "blind shots," you probably would have observed conditions around the first premolar. Is it economy of films which leads men to limit radiographic examinations to one or two distorted negatives? It cannot be economy of time, for a thorough examination is the greatest time saver in any treatment.

Second. A marked periapical destruction around the first premolar is

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evident from the films submitted. Doubtless, you were looking for a round black spot, labeled "abscess." The discharging sinus should have forewarned you that probably there was not a typical "granuloma" present, because of the drainage. If you had carefully studied the films, you would have seen the obliteration of the lamina dura around the apical third, and an apparent necrosis of the root end.

Third. You should have attempted to trace the course of the sinus before making a diagnosis, the best method being to gently insert a gutta-percha probe, allowing it to follow the direction of least resistance until obstructed.

Fig. 3.

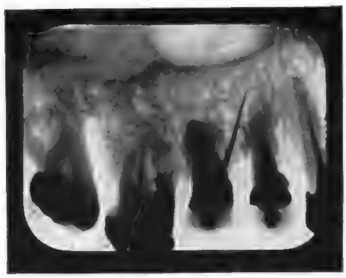

Fig. 4.

Fig. 5.

Figs. 3, 4, and 5.—The application of a gutta-percha probe to ascertain the course and origin of fistulous tracts.

If the probe passes sufficiently far to reach the alveolar process, and the course is not influenced by the opinion of the operator, it may be depended upon to serve as an indicator pointing at the guilty tooth in subsequent radiograms. (Figs. 3, 4, and 5 illustrate the application of this method.)

Fourth. The second premolar should not have been opened without a vitality test. In the absence of special appliances for pulp testing, a hot burnisher or a piece of ice would likely have given a conclusive response. Pulp testing is not an exact science, but it is an invaluable adjunct to diagnostic methods. The recent text book on the subject by that keen analyst, Dr. Howard R. Raper, should be assimilated by every dentist. When dentists seek information from professional authorities instead of "inhaling the bunkum"

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of instrument demonstrators and nostrum vendors, there will be a decisive advance in the general standard of practice.

Fifth. You should not assume that an abnormally short root or large apical foramen denotes absorption. It may be the result of arrested development in teeth with vital pulps. A sufficient number of such cases have been observed to suggest caution in concluding that all unusual roots of pulpless teeth are necrotic. (Figs. 6, 7, and 8 illustrate incomplete root formation in vital teeth of adults.)

Sixth. There is no evidence of infection from the mesio-buccal root of the first molar in the negative submitted, and beware of ill defined shadows around the buccal roots of maxillary first molars. Probably because of the thin buccal plate in this region, there is commonly an area of lessened density

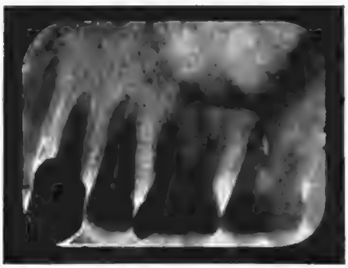

Fig. 6.

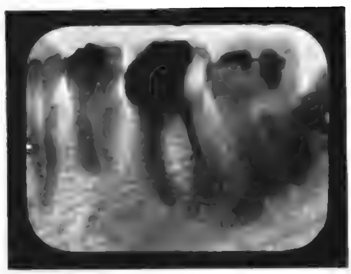

Fig. 7.

Fig. 8

Figs. 6, 7, and 8.—Incomplete root formation of vital teeth in adults.

around these roots, and special care must be exercised to differentiate between the normal radiolucence and the results of disease.

The course of a fistulous tract, seldom can be seen in radiographic records, but apparently you have demonstrated one in this case. It can be traced from the apex of the first premolar to a point opposite the second, where the opening was located. This would account for the suspicious area which appeared to be over the second premolar, and perhaps it could have been shown radiographically to be some distance from the tooth.

This case should have been only an interesting problem in radiodontic technic and diagnosis, instead of humiliating mistakes resulting in the loss of a tooth, a pulp, and some confidence. The canal operation in the second premolar indicates that you are a skillful operator. The diagnostic chart enclosed with your letter shows you are studious and have an exceptionally

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broad conception of dental practice. You are alert and progressive, because you have had radiographic equipment for several years, but the partial service which it gives you is lamentable. In this connection, you are not to be individually criticized; it is the general status of radiodontia, the most neglected phase of dentistry.

The chief interest of dentists in radiography is which machine to buy. After deciding this momentous question on superficial ground, they learn the manipulation of the switches from the salesman, and awaken the following morning expert radiodiagnosticians. Conceit and indifference prevent rapid improvement in this condition. When a dentist installs an automatic apparatus and finds he can "take an x-ray" (whatever that is) by pointing it at a patient and pulling the trigger, his egotism scorns additional knowledge. A purpose of this department is to plead the necessity for serious study of radiodontia. The suggestions are not offered in the guise of a master, but as an earnest student with appreciation of the difficulties encountered and some of the undeveloped possibilities.

Fertile Fields Await

Q.—Is it advisable for me to specialize in dental radiography in a town of 75,000 inhabitants? Several other dentists have machines and there are two x-ray laboratories run by physicians.

A.—There should be competent radiodontists in every city, but whether or not it is advisable for you to limit your practice to radiodontia depends upon your qualifications.

Radiodontia as a specialty is comparatively undeveloped, and abundant opportunities await men with the ability and initiative to grasp them. Oral radiography is probably not used in 5 per cent of the rational indications for it. The demand for the more skillful and general application of radiography in oral diagnosis is steadily increasing, but at least a decade will elapse before the application will approximate the indications. A general radiodontic examination is indicated annually for each individual from the age of eight until all the teeth are lost and the edentulous process is normal. Dentists correctly advise a clinical examination semi-annually. Why a partial investigation when the means of a thorough one are available? Proximal caries are disclosed by x-ray examination long before it can be discovered by other methods; why wait for the explorer, with dentin and possibly pulp infection? Marginal disturbance usually can be diagnosed earlier by bone charges than gingival manifestations; why procrastinate with a destructive process, if pyorrhea alveolaris is to be prevented instead of "prolonged"? Marked periapical alterations occur within six months. Why depend upon improbable subjective symptoms when chronicity is so important in prognosis?

Special radiodontic examinations are indicated in orthodontic treatment, extraction of teeth, pulp canal operations, traumatic injuries, etc. Practicing any branch of dentistry without the assistance of radiography may be compared to a dentist with a $^{20}/_{100}$ vision trying to operate without lenses to correct the deficiency. He may deceive his patients and overcome the handicap

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to some degree, but he could facilitate his work and render better service with unimpaired vision.

With this field in prospect and awaiting development, radiodontia is greatly undermanned. Your city needs radiodontists. If you enter the practice with a realization of the responsibilities, the requisite technical knowledge, and professional integrity, you will succeed. Other dentists who have radiographic equipment need not be considered in your decision. They will help to popularize radiography, but the usual mediocre results of men in general practice will offer no competition. The laboratories conducted by physicians will retain only the patronage of some physicians who value professional friendship more than professional service, and some dentists who have neither the honesty nor courage to expose their operations to another dentist. Humanitarian service calls; professional evolution is auspicious; introspection alone must decide the issue for you.

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ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

Orthodontia — Oral Surgery — Surgical Orthodontia — Dental Radiography

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Dental Disease as Related to Systemic Disease. C. J. Grieves (Baltimore). The Dental Cosmos, December, 1921, lxiii, 12.

This subject enables us to group dental diseases along special lines. In one class we see the results of local injury and bad dentistry, in another the oral manifestations of general states as pregnancy, diabetes and metallic poisoning, and in a third conditions which may be both local and systemic at the same time, as lues and other general infections. All of these affections may cause alterations in the mouth which may later serve for focal infection—breaches of continuity which may form the nidus for an infectious process. Considering the theoretical possibilities focal infection may be regarded as rather rare in proportion to the number of ports of entry. The teeth may be the source of other anomalies due to reflex irritation (as nervousness, migraine, referred pain), to secondary deformities of the nasal chambers, to malignant disease from irritation of the mucosæ by the teeth, etc. Focal systemic disease is eminently a chronic process which differs radically from acute sepsis originating in the mouth.

The author proceeds to a study of apical and gingival atria which present a sharp contrast from the standpoint of treatment. In the former the tendency is to extract and in the latter to conserve the teeth. Something seems radically wrong here and the two problems should be harmonized as far as possible. It has been shown for example that teeth which are apparently only gingivally diseased harbor pathogenic organisms in 50 per cent of the cases. This should convince us that the mere presence of germ life in a tooth does not constitute disease. So-called latent infection is not in itself a *motif* for extraction. To reckon that such foci must sooner or later abscess is to go against all experience. But certain exceptions must be made as in the case of bicuspids and molars lying in or near the antrum floor, in which the radiogram is unfavorable. Here a sound apex may not justify retaining the teeth.

Such cases do not affect the fact that as a rule apparently healthy, well filled pulpless teeth may be retained despite latent microbism. The author however disputes the accuracy of the claim that granulomata are harmless formations which contain only a few nonvirulent streptococci. Mixed infec-

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tion is common and the cell reactions are often toxic. We certainly canno guarantee that these foci will always be harmless. The author appears to drav the line on teeth with actually infected apices, which he regards as candidate for extraction. This is very different from wholesale and promiscuous extrac tion and curetting. He in this connection imputes to the discovery of loca anesthesia the possibility of doing an infinite amount of mischief by semi educated dentists.

A Plea for Surgical Exodontia. L. W. Silverman (Syracuse). The Denta Cosmos, November, 1921, lxiii, 11.

Surgical exodontia dates from the discovery of dental focal infection. I necessitates on the part of the dentist an increased study of anatomy, specia positions of the chair and operator, surgical sterilization and an operativ technic. Under the head of anatomy the x-ray will supply most of the informa tion although the dentist should be conversant with the anomalies of roots the relation of the latter to the antrum, etc. The patient has a marked fea of the surgical extraction which he seems to associate with the afterpain o bungling ordinary extraction. In some cases bromural is given to overcom the nervousness. In extraction of maxillary teeth patient should be placed i the almost supine position with head thrown far back; in mandibular extrac tion the occlusal plane should be almost horizontal. The operator shoul always stand with the tooth in full view. From the standpoint of extractio the author makes seven classes of teeth. We may only note what he says o the last class comprising the wisdom teeth. Here extraction is often difficul as in case of large size with bifurcated and distally curved roots. As a rul the elevator and forceps should both be used if the second molar is intact. I granulomata are already present as shown by the radiogram it may be necessar to operate after the tooth has already been pulled without subsequent curettag In all such cases after extraction the gum and periosteum should be incise and the flaps held out of the way (provided of course that the alveolus canno be curetted through the socket). The alveolar plate is then chiselled away If a root is present it should be extracted, after which the cavity can b curetted. The radical surgical exodontia is required in the case of impacte teeth although these particular teeth are not infected teeth at all.

The Tenth Case. Herbert McConathy (Miami). The Dental Cosmos, Novem ber, 1921, lxiii, 11.

The author refers to the belief that one dental case in ten is foredoome to be unsatisfactory to the patient because of some complication like necrosi of the bone, infected antrum, need of root amputation, etc. The dentist ma at least be able to anticipate these troubles and in part discount them by mal ing routine blood examinations. If the blood is affected this in turn is onl a symptom and one must seek its cause. Every dentist should cöoperate wit a good internist, who must be both able and willing to assist him. But h hesitates to take this step for fear of alienating other practitioners. Ther are other reasons why the dentist does not wish to call in a medical man; on

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s that it makes him appear to sidestep responsibility. This viewpoint, however, is probably unsound. It may be possible to refer the patient back to his family physician but the better course will doubtless be to send him to the internist who is known to avail himself of all laboratory resources. The whole thing is often a matter of diplomacy, for should anything go wrong the patient will have had the best local opinion, the dentist's responsibility being cut in two.

Influence of the Teeth on the Clinical Evolution of Fractures of the Maxillae. Cavina (Bologna). La Stomatologia, January, 1921.

The author concludes his long study of the above subject as follows: It has been shown that teeth interposed between the fragments of a fracture, or very near its focus, may be the cause of slow union, false joint and bone fistulæ. In all three cases the mechanism is essentially an osteitis of the fragments provoked by a primary periodontitis, or, more frequently, by a secondary periodontitis due to degeneration or necrosis of the pulp and of traumatic origin. Less infrequently the delayed union and false joint are due to the persistence of dental roots wedged between the extremities of the fracture. This etiology being known one may prevent the consequences by a rational treatment as follows: teeth wedged between the fragments should without exception be at once extracted; teeth by the side of the traumatic focus should also be extracted if quite free in their sockets or very loose; dead teeth or those suspected of devitalization should undergo precocious extirpation of their pulp, if there are no peridental complications; either extraction or attempt at conservation when there is inflammation of the dental ligament; avulsion in all cases from the time of appearance of purulent periodontitis, periostitis, or osteitis or when a fistula has formed. In all cases of retarded union, pseudarthritis and fistula, the teeth should be carefully examined, including study of a good radiogram, and one should not hesitate a moment to follow the rules as above laid down.

The Crushing Power and Masticating Area of the Teeth. Iwao Ono (Kyoto). The Dental Cosmos, December, 1921, lxiii, 12.

The sum of the masticating area and crushing power is equal in theory to the digestive capacity, and in one way the function of dentistry is to restore lost digestive capacity. The average crushing power is reckoned as nearly 30 lbs. per square inch and even for the toughest uncooked food articles a pressure of more than 100 lbs. to the square inch is seldom necessary. In order to obtain a further idea of mastication the author devised artificial jaws with porcelain teeth estimating the frequency of masticatory movements as 40 to the minute. It is possible to regulate the grinding stress from 10 to 200 lbs. to the square inch. Naturally only the premolars and molars enter into the computations. The total masticating area is not stated but appears to be something under 200 sq. cm. or more accurately about 11 square inches. Loss of the first molar reduces the entire crushing area one-fourth, but experiments

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with digestive fluids and certain foodstuffs seem to show that the actual loss of digestive power is one-third. This difference can only be due to the superior importance of the first molar in mastication. For the subject with defective teeth, to offset their loss, his food must be softer or better cooked, and he must chew longer but, of course, his best hope is restoration of the grinding surface. In speaking of such restoration as possible by prosthesis and plate teeth the author ignores the statement of authors that the pressure of the latter is only a small fraction of that of natural sound teeth.

Traumatic Occlusion and Its Correction in the Treatment of Pyorrhoea Alveolaris. Tom Smith (Langton). Journal of the National Dental Association, December, 1921, viii, 12.

Whether this affection is a cause or effect of pyorrhea has been much debated, and the author believes that both sequences occur, which of course facilitates vicious circles. A few experts are in the habit of grinding down the high spots by carborundum but the general run of dentists are apt to overlook traumatic occlusion, or to grind at haphazard, which tends to ruin the occlusion altogether. Any condition which contributes to loss of function may be a factor in traumatic occlusion. The symptoms in addition to functional insufficiency are gingivitis, unmotivated calcareous deposits and fine dark red lines on the gum tissue parallel to the roots, especially on the lower labial gum tissue—these being early evidences—with eventual loosening of the teeth, pocket formation in the alveolus and tenderness of the teeth on percussion. Functional disturbance involves the act of swallowing which is normally performed several hundred times daily. Unless there is perfect occlusion swallowing is imperfect and the normal suction exerted upon the teeth is almost lost. Loss of swallowing ability will also cause malocclusion and habitual swallowing is a factor of importance in drainage of the mouth, incidentally removing decomposing food particles. In discussion of this paper Bricker of Rochester, Minn., mentioned that he instructs all of his patients to swallow forcibly after the routine cleansing of the teeth.

Employment of X-ray Dosage in the Treatment of Pyorrhea. J. L. Garretson (Buffalo). The Dental Cosmos, November, 1921, lxiii, 11.

The author mentions the absence of pyorrhea in children and the negative result of inoculating healthy pockets with pyorrheic microorganisms. Apparently it is more a matter of unhealthy soil with low defensive powers than of the virulence of the organisms present. On the other hand the latter are not mere saprophytes. The condition may be likened to acne vulgaris, for the presence of the germs causes local disturbances. If this theory is correct pyorrhea should improve spontaneously as the condition of the tissues improves and this as a matter of fact does occur with the assistance of local treatment. Studies of a number of different observers appear to show that the x-rays do not sterilize the tissues, yet do cause improvement in the disease. The presumption is that in some manner the rays increase the resistance. This

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esult might come about in various ways as by causing absorption of infected issues or by sealing up the lymphatics. Conditions here may be similar to hose in infected tonsils which also benefit from radiation. The latter process an favorably affect tissues which are inaccessible to other methods. Serial essions 10 or 15 days apart are advised if the dose corresponds to one skin mit. If the dose is smaller the interval may be reduced to 6 days. After three essions of the latter type the dose may be increased to a skin unit every two veeks. Three or more exposures are in any case necessary to ray the entire ace, using an aluminium filter to protect the skin. It is desirable that rayed reas do not overlap one another, and this may be avoided by using lampblack pplied to the rim of a treatment cone. The author gives formulæ for dosage vhich comprise the ampèrage, length of spark gap, time exposure and thickless of filter.

Epilepsy Due to Unerupted and Impacted Molars. W. G. McGauley and F. H. McGauley (Boston). The Dental Cosmos, January, 1922, lxiv, 1.

A boy aged fifteen years had been an epileptic for two years and the ttendant medical men knew of no determining causes. The family history vas negative. On one occasion, during April, 1921, he seems to have fallen unconscious while at school, remaining in this state for three-quarters of an hour. There is no mention of a major crisis but a dull feeling in the left side of the face with a tremor of the jaws may have been an abortive attack of aura. Two days later there was a second similar attack, the sensory aura—if hat is what it was—being referred to the left lower jaw. The physician suggested the extraction of the second molar tooth in that region but the dentist refused to pull it without a reason and the tooth was quite sound. Another dentist suggested an x-ray and the authors were asked to take charge of the case. The radiograph showed a partly developed and unerupted third molar n the left lower jaw. After a blood Wassermann proved negative the patient was placed under ether narcosis and the tooth in question removed by the indicated technic. During the next few days there was some twitching and trembling on the right side of the face and another radiogram showed an analogous condition of the right wisdom tooth of the lower jaw. A second operation was at once performed (April 23). When last seen, on July 15, the patient had had no further manifestations of epileptic or convulsive character.

Surgical Management of Serious Focal Infections. T. A. Hardgrove (Fond du Lac). The Journal of the National Dental Association, January, 1922, ix, 1.

In his summary the author insists that we should not forget that the subject often involves the alternative of life or death, and hence the dentists should shirk no possible responsibility from this angle. Serious cases of focal infection should from analogy with other serious illness be treated at the hospital, if for no other reason than for the sake of the accurate records made and preserved for future teaching values. Further, the likelihood of the most serious complications gives the patient an advantage if emergencies are to

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arise. Thus in case of lowered blood tension and threatened cardiac collaps the patient is much better off within the hospital walls. If the patient chanc to be a victim of some form of nephritis the possibility of serious complic tions involving the heart, respiration and brain, is great. In case the patie suffers only from uncomplicated heart disease with good compensation, the is, on the other hand, no special likelihood of severe complications and t advantages of hospital treatment are less pronounced.

It should not be forgotten that the main object in removing an infect tooth is not so much to get rid of the tooth as to make possible efficient drai age of the focus. Before operating the blood pressure should be taken and the systolic and diastolic pressures nearly coincide operation may be contr indicated even under local analgesia. There should be no routine opening the antral cavity. In the case of a badly infected and firmly implanted thi molar in a subject over 55, the obstructing second molar should be first e tracted, otherwise there is considerable risk of fractured jaw. The auth prefers novocain to apothesin as a local analgesic.

In the discussion which followed the delivery of the paper Dr. Truma Brophy stated that the speaker was evidently dealing with an especially seve type of focal infection. As regards extraction primarily for drainage D Brophy believes that we may sometimes obtain good drainage without extra tion. We certainly should aim at such an ideal. The words "abscess" a "infection" when applied to the teeth are often misnomers and hence co fusing. Thus we have to infer the presence of pus and pent-up fluids, whi themselves remain invisible. The dark shadow may mean only a past absce in which absorption has taken place or even rupture; it may even appear the total absence of infection, as after root treatment. Finally the infectio when one is present, may be limited to the bone, with soft parts intact. T make sure of an infection the external alveolar plate should be penetrated a a few drops of pus or escaping fluid examined; this resource can almost alwa be utilized. If nonpathogenic organisms alone are present no operation shou be performed.

Dr. Rasmussen stated that the speaker had not mentioned the prognost significance of a sharp postoperative rise of temperature. Personally he h found this a good prognostic in that it shows an active defense on the part the organism. He would proceed very cautiously in a patient who did not th react after extracting one or two infected teeth. Rasmussen cites cases detail to illustrate his exact meaning. In closing Hardgrove added to t previous speaker's dictum that failure of the temperature rise after operati plus acceleration of the pulse pointed to a dangerous type of case.

A Case of Facial Fistula Due to Submaxillary Sialolithiasis. L. R. Kahn a J. Levy (New York). American Journal of Surgery, January, 192 xxxvi, 1.

The great majority of facial fistulæ originate in the teeth and the follo ing case is of interest because it had a different source. The patient was man of forty-one who four years earlier had noticed a swelling of the le

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ieek. An x-ray appeared to show that the lower left second molar was at ult, but after its extraction the swelling persisted for a long time and after s disappearance certain swellings appeared in succession within the left uccal cavity and ended by the escape of fluid. Two years after the first mptoms a fistula formed on the outside of the left cheek. X-rays failed to row light on its origin. The case at this period was very obscure and the istory of the man suggested the possibility of an actinomycotic infection in rly life and as a matter of fact the swelling subsided somewhat under potas-um iodide. Puncture of the swollen area was invariably negative. In Sep-mber, 1921, there was a renewed attack of swelling which involved the sub-axillary and submental regions and the x-ray showed the presence of a lculus which after excision was found to have formed in the submaxillary uct. After this event the symptoms subsided spontaneously and the fistula ealed. It was apparent that the molar tooth had been needlessly sacrificed. he calculus was ⅞ inch in length and bore resemblance in size and shape to a anine tooth.

s a Pulpless Tooth a Dead Tooth? R. W. Bunting (Ann Arbor). Journal of the National Dental Association, December, 1921, viii, 12.

This subject is the occasion of much debate and is not simplified by speak-ng of dead teeth as "devitalized" only. The real issue lies in the statement hat a tooth is or is not a foreign body in the sense of something which should e removed, an irritating or harmful foreign body. Generally speaking harmless oreign bodies may become noxious but usually give rise to symptoms in becom-ng so. The author seeks an objective criterion of harmlessness and finds it n the intactness of the peridental membrane. With normal peridental mem-rane, in other words, the tooth is not technically dead. If this structure ecomes injured or infected the status of the tooth becomes open to doubt, ut in some cases of injury remarkable recoveries have been seen and the ooth thus injured cannot be officially condemned. The death of the cementum ollowing the death of the peridental membrane is the factor which makes of he tooth root a true injurious foreign body but conservative dentistry can till render the tooth harmless even after the supervention of necrosis of both ementum and pericementum.

Why Some Pulpless Teeth are not Pathogenic. C. J. Grove (St. Paul). Dental Items of Interest, January, 1922, xliv, 1.

In the author's experience 25 per cent of all pulpless teeth are free from infection. There never has been a period in the evolution of the science of dentistry when the extraction of these teeth was indicated. He also takes issue with the teaching that pulp left in root canals invariably decomposes. This only happens when the quantity which remains behind is considerable; a little pulp becomes organized. Why then is not a large amount of pulp likewise organized. The pulp in the apex of the root apparently contains vital tissue which is not the case with the remainder. Whenever we find normal

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periapical tissue about a pulpless tooth the possibility of subsequent infection is not to be taken into account. It is not even necessary or advisable to fill these roots. The conditions differ alike from those in which the mass of the pulp has decomposed and those in which the periapical tissues have become infected. The author takes issue with the majority of dentists when they claim that complete filling of root canals prevents periapical infection; in his own experience the exact opposite is the case, not indeed by right, but because of certain technical errors. There is much less infection when the root filling is less thorough. Once having assured ourselves that the roots are not infected for reasons already explained, the proper course is to let them alone. If the fillings have been removed from such teeth he would not refill. In general the dentist when he removes pulp should not disturb that in the apex. Attempts to destroy the latter only too often cause periapical infection instead of preventing it.

Treatment of Toxic Anesthesia from Local Anesthetics. H. E. Tompkins (New York). Dental Items of Interest, January, 1922, xliv, 1.

In the course of an article on the toxicity of anesthetics and the prevention and cure of these accidents, the author sums up the management of a case as follows. The patient has fainted or is in collapse. The first thing to do is to send for the nearest physician, not because of any superior knowledge on his part, but out of policy. In case of failure to revive, the doctor has to share the responsibility and only a physician can sign the death certificate (at least in New York State). If death occurs without apparent sufficient provocation the condition known as status lymphaticus will commonly be present. The first actual step to take will be the injection of 1 c.c. of pituitrin, if practicable into a vein, otherwise intramuscularly. Should there be whiskey at hand, a glass should be poured out but not for the unconscious patient; for the dentist will doubtless be in such an unfortunate mental and physical state that he will benefit by its use. The patient has of course been laid flat on a couch or on the floor. The clothing is now opened and the sphincter ani dilated using some force. Thus far not over one minute should have elapsed. If the subject has not rallied, artificial respiration should be begun while at the same time ammonia is held to the nose. Coughing or choking is a good omen of recovery. If there is no response to ammonia, ether may be substituted without fear of adding to the damage. In the meantime if there is a pulmotor at the gas company's offices or elsewhere it should be sent for and manual respiration kept up until it arrives. Heart massage may be added but in the author's opinion it often makes matters worse. Strychnia, caffein and other analeptics are of no value whatever, until the victim is out of danger. The chance is that if he is alive after the first five minutes he will recover.

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EDITORIALS

)ualifications for Membership in the National Dental Association and State and Local Societies*

SEVERAL years ago when the National Dental Association was organized, making the state societies component parts of the National Dental Assoiation, it became necessary for several state and local societies to change heir constitutions and by-laws to conform to the plan of the National Dental Association. In fact the constitution and by-laws of the National Dental Asociation were revised in order to enable men to become members of comonent societies. Prior to that time it had been possible for individuals to old membership in the National Dental Association without being members f the state societies.

When this reorganization took place, independent membership in the National Dental Association became impossible and at the present time no one

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can be a member in the National Dental Association who is not affiliated with the state society. It also followed that most state societies were divided up into component societies or districts and now it is necessary for a man to become a member of his local or district society before he can become a member of his state society.

As a result of this plan, at the present time, the only possible way for an individual to obtain a membership in the National Dental Association is through the state society, and the only way he can obtain membership in the state society is through his local society. This resolves itself into a plan whereby it is impossible for any one to become a member of the National Dental Association unless he is a member of the local society representing the state society in the community in which he practices. Therefore it is very important for the National Dental Association that there be a similar qualification for membership in all local and state societies that are component parts of the National Dental Association.

Up to the present time there has been little conflict in regard to the by-laws of different local and state societies in reference to membership, because it has been generally agreed among men in the National Dental Association that the qualification for membership in a local dental society should be; namely, that a man is a legal practitioner, conducting his practice along professional and ethical lines and in accordance with the code of ethics of the National Dental Association.

If the National Dental Association is to render services to the dental profession, from a scientific standpoint and professional advancement, it necessarily must have as large a membership as is possible. In order for this to be accomplished local societies all over the United States should have uniform qualifications for membership in order that all men will have equal privileges in the National Dental Association.

It has been brought to our attention that the First District Dental Society of New York has adopted a set of by-laws which seems to be at variance with the purpose of the National Dental Association and which will defeat the very purpose of the organization of the National, when we remember that membership in the parent body is possible only by membership in the local and state society. Some local societies may believe that they have a right to establish any qualification for membership they so desire and at first thought they may seem to be correct. However, such a plan as that is only a type of the doctrine of "state rights" which has always been more or less of a contention with the various states, when they desired to do something that conflicted with the Constitution of the United States.

At the present time the National Dental Association with its charter and by-laws, is very similar to the Federal Government. The state societies and component societies have the right to make their constitutions and by-laws, but these rules which the local and state societies make should in no way conflict with the National Dental Association. The local societies of any com-

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unity should not make restrictions in regard to membership which would detrimental to the parent body.

The First District Dental Society has created a so-called "junior" mem-rship. It is not really a membership because "junior" members have no ght in the state or National Dental Association. The "junior" membership composed of recent graduates of dental colleges who are legally qualified practice dentistry but must remain "junior" members for a period of ree years. They pay no dues and have only the privilege of attending eetings of the First District Dental Society. This is an unjust discrimina-on against the recent graduate, and is contrary to the purposes of the ational Dental Association according to its present plan of operation.

We find that in order to become an active member in the First District ental Society, a man must have been engaged in the ethical practice of dentistry r a period of five years. The by-laws do not specifically state that he must ive practiced these five years in the First District, but the Chairman of the ommittee that proposed the present by-laws stated from the floor that it as the intention of the by-laws to mean that a man locating in the First istrict must have practiced five years in the First District before he can ecome a member.

This qualification for membership is extremely unfair to the older prac-tioners because a man might be engaged in the practice of dentistry in ew York State or some other district for eight or nine years or longer and cate in the First District. He could not become a member of the First District ociety until he had practiced in that district five years. Of course, accord-g to the present by-laws of the New York State Dental Society he would not forced to give up his membership in the other district from which he moved and therefore could still retain his membership in the National ental Association, even if he was not a member of the First District Dental ociety.

However, we find this qualification for active membership as required y the by-laws of the First District Dental Society extremely unfair to men ho have been engaged in the ethical practice of dentistry in another state ian New York, and decide to locate in the First District of New York.

Article III, Chapter 1 of the by-laws of the National Dental Association oecifically states that a man can only be a member of the National Dental ssociation by having a membership in the state society in which he practices. he present arrangement of the by-laws of the First District Dental Society ould therefore require a man who had been a member of the National ental Association for a number of years and who located in the First District f New York, to give up his membership in the National Dental Association or a period of five years before he could again become a member. Because f this conflict in the by-laws of the National Dental Association and the 'irst District Dental Society, one or the other must be changed out of justice o the older practitioner.

We believe the by-laws of the First District Dental Society or any other

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dental society should be made to conform with all local and state societie and component societies of the National Dental Association. If the Firs District Dental Society was not a component part of the state society and i a man residing in the First District could obtain membership in the Nationa Dental Association without becoming a member of the First District Denta Society then we would be willing for the First District Dental Society to hav any restriction to membership they so desired.

If any local society that is a component part of the National Denta Association desires to have a membership requirement which is in conflic with other local and state societies and detrimental to the best interest of th National Dental Association, they should give up their representation of th National Dental Association and allow some other local society to become th representative of the National Dental Association in that district.

In the First District of New York there are other dental societies an one particular society has a much larger membership at the present tim than the First District Society has. Some of the members of this local denta society, which is not a component part of the National Dental Association ar also members of the First District Dental Society and thereby have representa tion in the National Dental Association. The other members of this larg local dental society who are not members of the First District Dental Society although engaged in the ethical practice of dentistry, are denied member ship in the National Dental Association under the present arrangements. I is very probable that other local societies have similar restrictions in regar to membership which are detrimental to the best interests of the Nationa Dental Association.

For that reason there should be some one with sufficient power to mak all component societies of the National Dental Association have similar quali fications for membership regardless of the state in which that componen society is located. Unless this is accomplished, the National Dental Associa tion will not be the democratic body many hope it will be, neither will it b able to render the best services to the profession.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but ı order to do so must have the full support of the orthodontic profession throughout the ountry. We would deem it a great favor if our subscribers and readers would send in ıch announcements as might be of interest to the profession.

American Society of Dental Radiographers

The Annual Meeting of the American Society of Dental Radiographers vill be held at the Ambassador Hotel, Los Angeles, California, on Wednesday nd Thursday, July 19-20. A program of unusual interest is being prepared y the Program Committee.

The following is a partial list of papers which will be presented:

"Some Procedures Found Helpful in Making Dental Radiograms." By)r. J. A. Blue, Birmingham, Ala.

"The Importance of Radiography in Referred Cases From the Medical 'rofession." By J. A. Bliss, Sioux City, Ia.

"Encouraging the Use of the X-Ray Machine by the Individual Dentist ı His Office." By J. D. McAlpin, San Francisco, Cal.

"Radiography and Diagnosis from the Viewpoint of a Dental General 'ractitioner." By Stephen A. Palmer, Poughkeepsie.

"A Plea for a Standard Terminology in Dental Radiography." By Leand E. Carter, San Francisco, Cal.

H. C. McKittrick, President, I. O. O. F. Bldg., Indianapolis, Ind. Martin)ewey, Secy.-Treas., 501 Fifth Avenue, New York, N. Y.

National Dental Convention

The Twenty-Sixth Annual Convention of the National Dental Association vill be held in Los Angeles, California, July 17 to 21, 1922.

The Ambassador, one of the city's newest and largest hotels, situated in he heart of one of the most beautiful residential districts, will be convention ıeadquarters and practically all sessions can be held in the hotel or on the ;rounds.

The Local Committee on Arrangements can safely state that this meeting vill provide an excellent program, demonstrating that "Dentistry can add ten 'ears to the average of human life." This committee can also safely state that our visitors will be well entertained during their sojourn in Los Angeles.

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It is none too early to plan a vacation westward in July, 1922, and to send for hotel reservations.

Watch for further and detailed announcements in all Dental Journals. The Local Committee on Arrangements, C. M. Benbrook, General Chairman, 707 Auditorium Bldg., Los Angeles, California.

Pacific Coast Society of Orthodontists

A cordial invitation is extended to all interested in orthodontia to attend the next Annual Meeting of the Pacific Coast Society of Orthodontists, which will be held in Los Angeles, California, July 13, 14, 15, 1922. Those who contemplate being in attendance are requested to make known their intention to the Secretary as soon as possible. Charles G. Mann, President, Seattle, Washington. Carl O. Engstrom, Secy.-Treas., Box 1070, Sacramento, Calif.

Edward H. Angle Society of Orthodontists

The regular meetings of the Edward H. Angle Society of Orthodontists are held at the Hotel Vista del Arrayo, Pasadena, California, on the afternoon and evening of the first Monday of each month.

The regular annual meeting of the Society will be held at the same place on Monday and Tuesday, June 5 and 6, 1922.

Notes of Interest

Dr. George E. Halley announces the removal of his office to 607 Bryant Building, Kansas City, Mo., where he will continue to practice orthodontia exclusively.

Dr. Frank W. Rounds, Clinical Associate of Dr. George B. Winter, of St. Louis, announces the opening of offices in the Professional Building, 270 Commonwealth Avenue, Boston, Mass., for the practice of exodontia and radiodontia exclusively.

Dr. J. F. McDonald announces the removal of his office to 703-4 First National Bank Building, Birmingham, Ala. Practice limited to orthodontia.

Dr. Frederic T. Murlless, Jr., announces that he has removed his office to 43 Farmington Avenue, Hartford, Conn.

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ORIGINAL ARTICLES

THE INFLUENCE OF THE FORCES OF OCCLUSION ON THE DEVELOPMENT OF THE BONES OF THE SKULL*

By Lawrence W. Baker, D.M.D.
Assistant Professor of Orthodontia, Harvard Dental School, Boston, Mass.

TO PROVE a biologic law requires much patient labor, and indeed even to put on a firm foundation a single physiologic fact, as I am attempting to do in this series of investigations, is necessarily a long, slow process involving many painstaking experiments, as well as many collateral observations. As a matter of fact it was in 1909 that I began my initial experiment, and from that time up to the present I have been constantly at work either experimenting or collecting data; and although I have brought some interesting facts to light, still I am forced to admit I have not compassed the subject. The deeper I go into the work the more its complexities are appreciated, and I am mindful of the many influences operating both from within as well as from without which contribute in the development of the skull. Furthermore, the relationship between the function of the dental apparatus and the skull form in the various groups of lower animals as well as in the various types and races of man is a most intricate and difficult subject to investigate. But it is the encouragement that I am receiving from eminent anthropologists and the interest shown by my co-workers that keep me at the task.

It might be added in these introductory remarks, it was my intention at this time of giving only a short account of my latest unpublished experiments,

*Read before the American Society of Orthodontists, Atlantic City, New Jersey, April 27-30, 1921.
From the Research Department of the Harvard University Dental School.

I wish to express thanks for the invaluable aid given by Prof. Walter B. Cannon during these experiments, and for the use of the Physiological Laboratory of the Harvard Medical School, and to Prof. Harvey Cushing for the use of the Surgical Laboratory, and for helpful suggestions; also to Prof. Reid Hunt for the use of his laboratory and his skilled assistant.

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but as the editor, Dr. Dewey points out, since my last published report of this work, which was before the Panama-Pacific Dental Congress in 1915, many young men have entered our ranks, and for the benefit of this younger element he has urged me to give a more complete report. I have yielded to his request and am therefore giving this more extended account, which includes an outline of my working theory, the salient facts regarding the earlier experiments added to my later experiments, so that the reader may trace the progress of my work from the beginning.

When the newborn babe enters this world, the muscles of mastication are

Fig. 1.—(After Cryer.) Transverse section through the human head in the molar region. Note the size of the masseter muscles and the extent to which they pull on the outer walls of the antrums and on the floors of the orbits.

among the first group of voluntary muscles to act. Their action means life, for it is by their function that nutrition is taken in. Long before the infant can hold up its head, or has gained control over those useful organs, the hands, the muscles of mastication are highly developed and are used with great vigor.

During the act of nursing, the action of this set of muscles is so vigorous that it demands an increased blood supply, to the extent that the heart action is greatly increased; the excessive flow of blood to these parts is indicated by a reddening of the whole head, and the fontanelles themselves are caused to

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pulsate, so that untrained observers comment on their movement. Later, with the advent of the dental equipment, this group of muscles is given more leverage, and its action becomes consequently more powerful; in fact, the force exerted on the bones of the head from the pull of these muscles during life is tremendous and amounts to many hundreds of thousands of tons of force. I have long been convinced that this great force on the skull, and the great flow of arterial blood to the head, caused by this muscular activity, is a

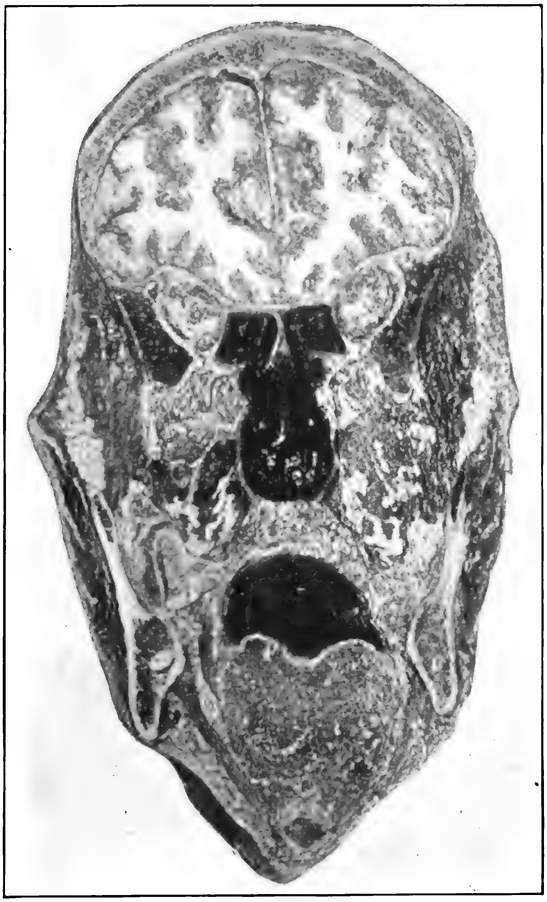

Fig. 2.—(After Cryer.) Transverse section through the human head in the region of the ascending rami of the lower jaw. Note the extent to which the muscles of mastication pull on the outer walls of the nasal cavities and the close proximity of the attachment of the temporal muscles to the brain.

powerful influence in the development of the bones of the head and the important organs incased therein. It is the object of my researches to throw some light on this important, but generally overlooked subject.

As this work is so intimately connected with the action of the muscles of mastication, it will be well to consider first a few facts pertaining to the general action of this group of muscles.

These muscles to a large extent surround the cranium, extending as they do from the temporal ridge on one side to the temporal ridge on the other side,

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and the internal muscles of mastication are attached surprisingly close to the base of the brain. All this is shown in Figs. 1, 2 and 3.

It will also be observed from these illustrations that these muscles are attached to the skull, and inserted into the mandible at many different places and in many different ways, so that they pull in as many different directions, but it is a singular fact that, varied as are these muscles in shape, size, power and action, they have one common function, the dental equipment. The teeth may be almost termed the fulcrum of this group of muscles, because it is only when the teeth are brought together forcibly, or come in contact with food in mastication, that the great power of these muscles is brought out. The truth of this statement can be tested by slowly bringing the teeth together. It

Fig. 3.—(After Cryer.) Transverse section through the human head further back than in Fig. 2. Note—1, that the muscles of mastication attach to the base of the brain-case; 2, compare the size of this muscular mass to the brain itself; 3, note the outward pull on the nasopharynx of both the external and internal pterygoid muscles.

will be noted that, while the mandible is swinging freely, the muscular action is almost passive, but the instant the teeth are brought into action, the muscles on the sides of the head and face will be seen to knot out and contract with great vigor, and, of course, the hidden powerful internal muscles do the same.

The resultant forces of these muscles are in reality the forces of occlusion, with which the members of this Society are so notably familiar. We well know that the forces of occlusion are based on definite laws, and it was the

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early recognition of these laws by us, and our application of these laws to orthodontia, that has placed our specialty in such an eminent position.

The experiments on which this paper is based and those which I have at present under way, make me believe that the reaction of these occlusal forces on the skull are based on as definite laws as are the forces of occlusion themselves; furthermore, I believe that in these reactions are locked some of the secrets of a normal skull; for, if a group of forces acts in accordance with laws, why should not the reactions of these forces be governed by just as definite laws as are the forces themselves?

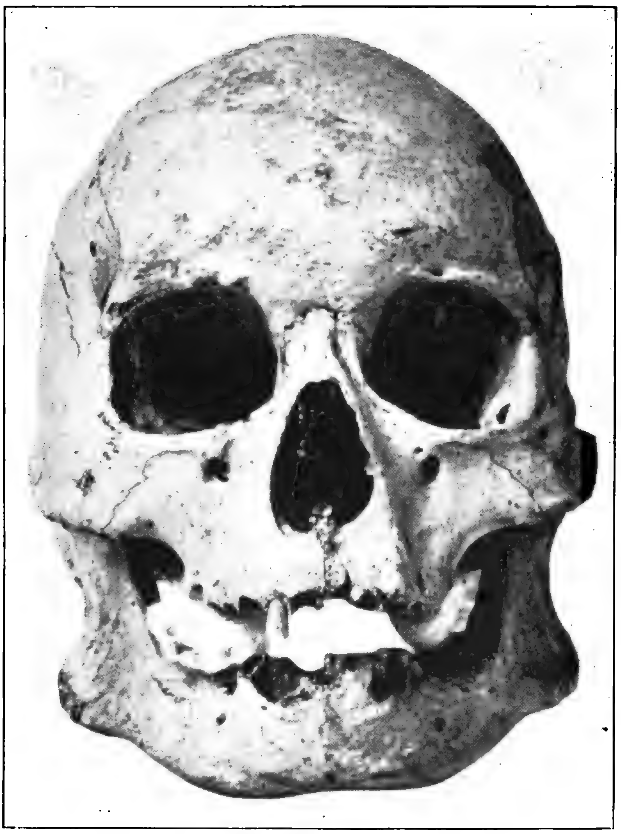

Fig. 4.—Skull of Eskimo. Observe the great facial breadth due to excessive mastication. (After Hrdlicker, Am. Mus. of Nat. Hist.)

Before leaving the first three illustrations, there are several other matters worthy of consideration; for example, note the area of this muscular mass (including the tongue) as compared with the whole head. It will be observed that it ranks well in size with the other structures or organs of this most compact, intricate and wonderful part of the human body. It is evident to me that Nature never would have devoted so much important space to this group of muscles, if it were not for the benefit of the head as a whole. According to the laws of evolution, the functional activity of such a mass of

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muscular tissue cannot but have a direct and powerful influence in shaping th
bones to which they are attached.*

Furthermore, the great supply of pure blood that the vigorous activit
of these muscles demands not only rushes to these muscles, but also to othe
parts of the head, and it seems no more than logical to believe that the brai
itself shares in this increased blood supply. The idea of muscular activit

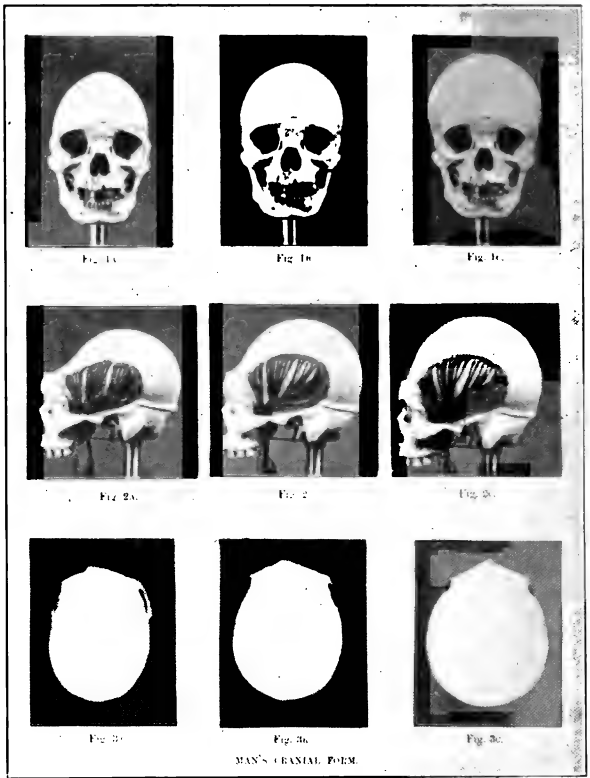

Fig. 5.—(After Prof. Arthur Thompson.)

*Figs. 4, 5 and 6, are illustrations of the effect of the use and disuse of the muscles of mastic tion on the human skull. Fig. 4 is the skull of a Southampton Eskimo (From Am. Mus. Nat. Hist. A thropological Papers, N. Y., 1910, Vol. V.). Observe the great facial breadth, with its corresponding broad and massive mandible. A. Hrdlicka states ("Contribution to the Anthropology of Central a Smith Sound Eskimo", Am. Mus. of Nat. Hist., Vol. V, Pt. 2 Anthropological Papers) that the great development is typical of the Eskimo and is due primarily to the excessive mastication whi their tough food requires. H. Whitney states in his work "Hunting with the Eskimo", that it probable no other race of man has a masticatory equipment powerful enough to perform the great wo necessary in the struggle for life in that barren region. Fridtjof Nansen, in his "Eskimo Life", al gives a very interesting account of the excessive use of the teeth in their diet and in preparing hid for domestic purposes; and Dr. E. A. Hooton, Professor of Anthropology, Harvard University, h pointed out to me that in the Eskimo this excessive use of the teeth has brought about a disharmon type of skull form.

Fig. 5 from "A Consideration of the More Important Factors Concerned in the Production Cranial Form", by Prof. Arthur Thompson, Jour. Anthropological Inst., xxiii, N. S. vi, 1903, is he introduced to show that anatomists recognize the influence of the muscles of mastication as a factor determining skull form. The illustration shows an ingenious experiment performed by Dr. Thomps in which he removed the top of the brain-case from a human skull and cleverly inserted an elast rubber bladder to which were attached artificial muscles made of silken cords. By inflating the bladder various degrees of tension, and by exerting pressure on it by means of the artificial muscles, he w able to demonstrate the various typal skull forms found in man, as may be observed.

Fig. 6 shows the effect of lack of use. The exceedingly poorly developed mandible is caus by the ankylosis of the temporo-mandibular articulation. This unfortunate deformity is typical of th condition when it occurs early in life. (See "Anthroplasty for Intra-Articular Bony and Fibrous Ank losis of Temporo-mandibular Articulation" by John B. Murphy, M.D., LL.D., from the Jour. A Med. Assn., June 4, 1914, Vol. lxii, pp. 1783-1794.)

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and increased circulation to the adjacent parts is a well-known fact. Dr. Campbell, in his remarkable series of papers* laid great emphasis on this matter.

It occurred to me that if my hypothesis regarding the influence of the dental equipment on the formation of the bones of the head were correct, interference with the laws of occlusion in the lower animals would show consequent effects in the formation of the bones of the skull; and if variation occurred, it might throw some light on the most complex problem of the development of the human head.

To test this theory, the following experiment was performed: A litter of four rabbits was selected at the age of weaning. One of the rabbits was chloroformed, and the skull procured is shown in Fig. 7. Two of the remaining animals were operated on by grinding down all the teeth on the right side of the mandible and the maxillary right central incisor. As the teeth elongated, repeated grinding rendered them useless, so that all the mastication was performed on the left side. The fourth rabbit was kept in the normal state for the standard of comparison.

Fig. 6.—Lack of growth of mandible, due to ankylosis of temporo-maxillary articulation. (After John B. Murphy, M.D.)

Fig. 7.—Skull of a young rabbit showing the state of development at the beginning of the experiment.

After seven months, the skeleton of one of the rabbits was procured and the skull was found to vary as is shown in Fig. 8 which is a photograph of its upper aspect. It will be noted, by the drawn lines, that there is a deviation of the bones to the left.† The suture between the parietal and frontal bones

*"Observations on Mastication", London, Lancet, July 11, 1903, "The Influence of the Contraction of the masticatory muscles on the Local Circulation of Blood and Lymph."

†Right and left in this description refer to the right and left sides of the animal. (The photographs are reduced in size).

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does not run strictly at right angles to the longitudinal axis of the skull; the right frontal bone projects further forward than the left one. It will also be observed that the left zygomatic space is longer and more advanced than the right space. The most noticeable deviation is in the nasal bones, both being twisted to the left.

On the lower aspect of the skull (Fig. 9), it will be seen that the deviation extends throughout the entire skull.* The most remarkable deviation is that the anterior root of the right zygomatic arch (the zygomatic process of the maxillary bone) is retreated, while the body of the right maxillary bone itself, with the teeth that it contains, is greatly advanced.

Figs. 12 and 13 show that the mandible, as might be expected, is also dis-

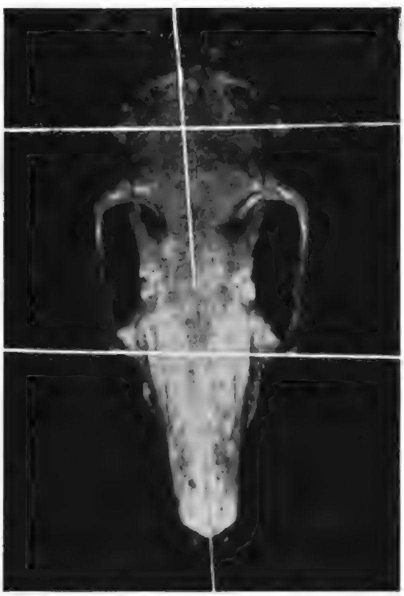

Fig. 8.—The upper aspect of a skull of an operated-on rabbit. Observe the unequal development of each lateral half of the skull.

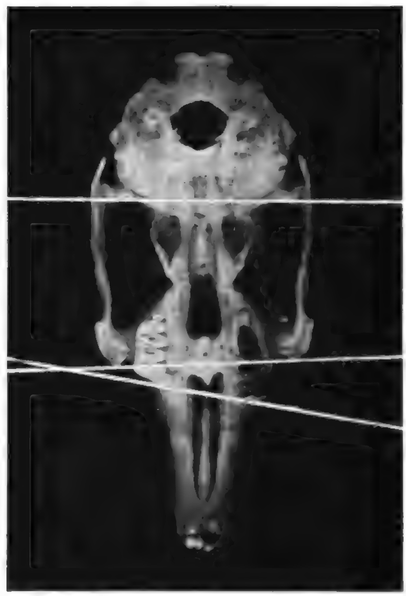

Fig. 9.—Lower aspect of Fig. 8.

torted, even to the size of the articular processes of the condyles (see Fig. 12). The one on the left, or working side, is perceptibly larger than the right. (Compare with normal mandible, Fig. 14.)

Three weeks later, autopsies were performed upon the second altered rabbit and on the "control" animal. In dissecting out the muscles that control the movements of the mandible, I was struck with the unequal muscular development of each lateral half of the altered animal. On the unused side the muscles were noticeably atrophied, and pale in color, as compared with the working side. Later, the skulls were weighed and both the worked-on

*Contrast Figs. 8 and 9 with 10 and 11, which are the same views of the skull of the control animal.

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skulls weighed much less than the normal skull, showing that evidently the interference had affected the general osseous development of the head.*

Figs. 15 and 16 show the upper and lower aspects of the skull of the second altered rabbit. It will be noted that it varies in a similar way to the first one.

Fig. 17 shows the anterior aspect of the mandibles of the animals operated upon and the same view of the control animal. The method of interference with the occlusal equilibrium is plainly visible, and it is also evident that this interference with the equilibrium of occlusion has had its tangible influence on the equilibrium of growth of the bones. In both mandibles *a* and *c*, of the operated-on animals there is a striking similarity of deformity. In both cases the ramus of the nonfunctioning side is shortened, and there is even a modification in the development of the temporomandibular articulation on this

Fig. 10.—The upper aspect of the skull of a normal rabbit of the same litter. Observe the normal development of each lateral half of the skull.

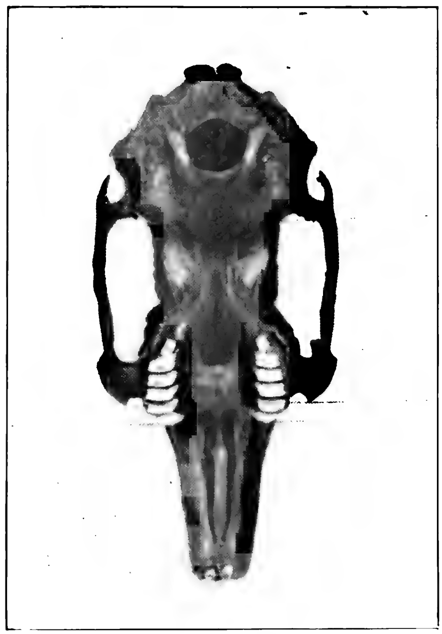

Fig. 11.—Lower aspect of Fig. 10.

side, as indicated by the shape and size of the condyle.† In the normal case *b*, it will be noted that there was an equilibrium of growth throughout, including both rami and condyles.

*Weight of animals:		Weight of skulls:	
Control	1631 gms.	Control animal	248 gms.
1st operated on	1478 gms.	1st operated on	227 gms.
2nd operated on	1735 gms.	2nd operated on	243 gms.

†The fact that the condyles were varied by the interference with the functions of the teeth coincides with a theory advanced by Dr. M. H. Cryer, in his work on the "Internal Anatomy of the Face" (pp. 157-159—First edition) regarding the skull of a human being in which the individual was forced to put the mandible in an abnormal position in order to masticate. The change in the occlusal forces caused a difference in the shape and size of the condyles. Owing to the lack of occlusion on one side, the markings of the origins and insertions of the muscles on that side were much less well defined than on the working side. This same condition was evident in my experiment; in fact, the condition went so far that the zygomatic processes on the nonfunctioning sides were perceptibly atrophied.

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Fig. 18 shows the posterior aspect of both skulls *a* and *c*, and reveals that the growth of those bones, far remote from the teeth, has been interfered with, as indicated by the lines passing through the junction of the superior aspect of the zygomatic processes and the sides of the brain-case, as well as by a

Fig. 12.—Lower jaw of operated-on rabbit. Note the lack of development of the condyle of the disused side.

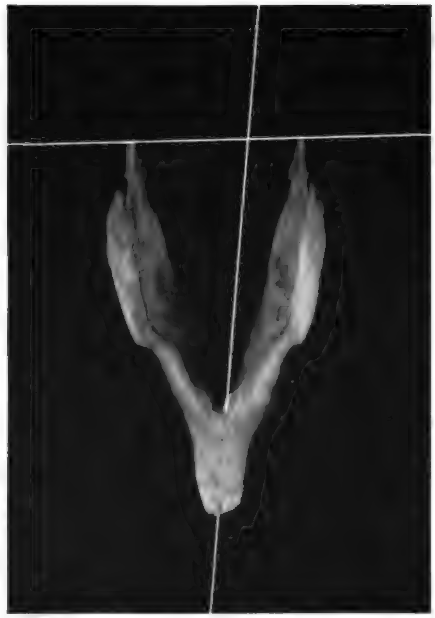

Fig. 13.—Lower aspect of Fig. 12.

Fig. 14.—Lower jaw of normal rabbit. Observe its perfect symmetry and contrast with Fig. 12.

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noticeable variation in the zygomatic spaces themselves. These spaces on the side operated upon are visibly much smaller than on the functioning side, whereas, in the normal rabbit *b*, there is little or no difference between them. From all points of view, the overthrow of the balance of growth here indicated accords with that found in the other views of the skulls, as well as in the mandibles.

The results of this experiment seem remarkable to me. Who would have thought that, by interfering with the laws of occlusion, the skulls would have decreased in weight, and that every suture and every bone in the head would have varied as we have seen? This experiment strongly indicates how important is the masticatory equipment of man to the development of the head, and it also brings fresh illustration of the importance of the sadly

Fig. 15.—Upper aspect of the skull of another operated-on rabbit of the same litter. Compare with Fig. 8 and contrast with Fig. 10.

Fig. 16.—Lower aspect of Fig. 15. Compare with Fig. 9 and contrast with Fig. 11.

neglected deciduous dentition which serves during the important developmental period of childhood.

The statement that the shape of the skull in the lower animals can be modified, by simply interfering with the function of the teeth, seems almost incredible. The truth of this statement can be better understood when we study further into the great power of the masticatory muscular system.

In the human being, the force required to thoroughly masticate a lean corned-beef sandwich, was estimated to amount to about three tons. Who would believe that 7,050 pounds of pressure were exerted on the bones of the skull through the medium of the teeth in masticating this simple article of food!

These figures were derived from the following test: A man with 32

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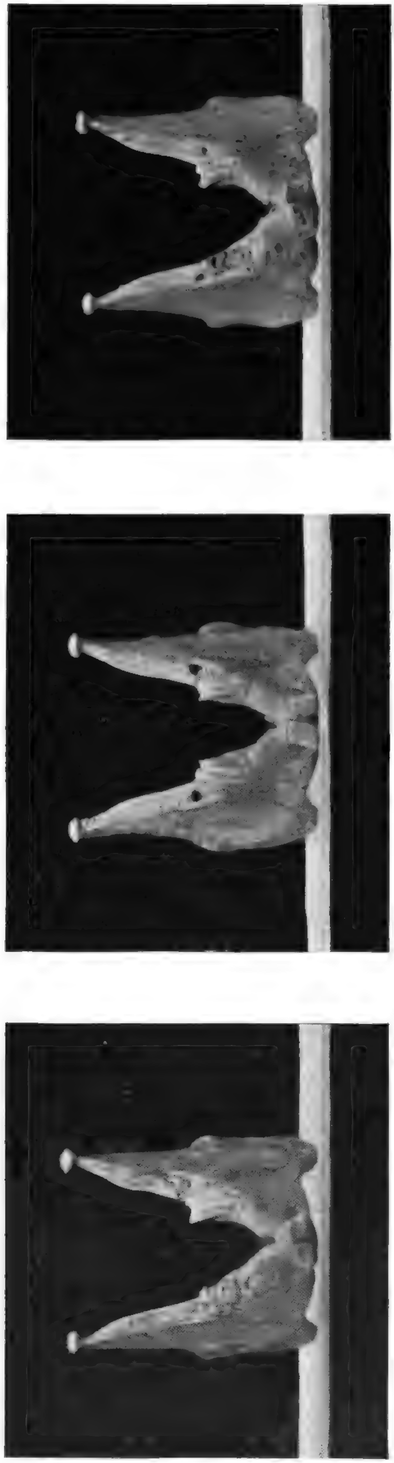
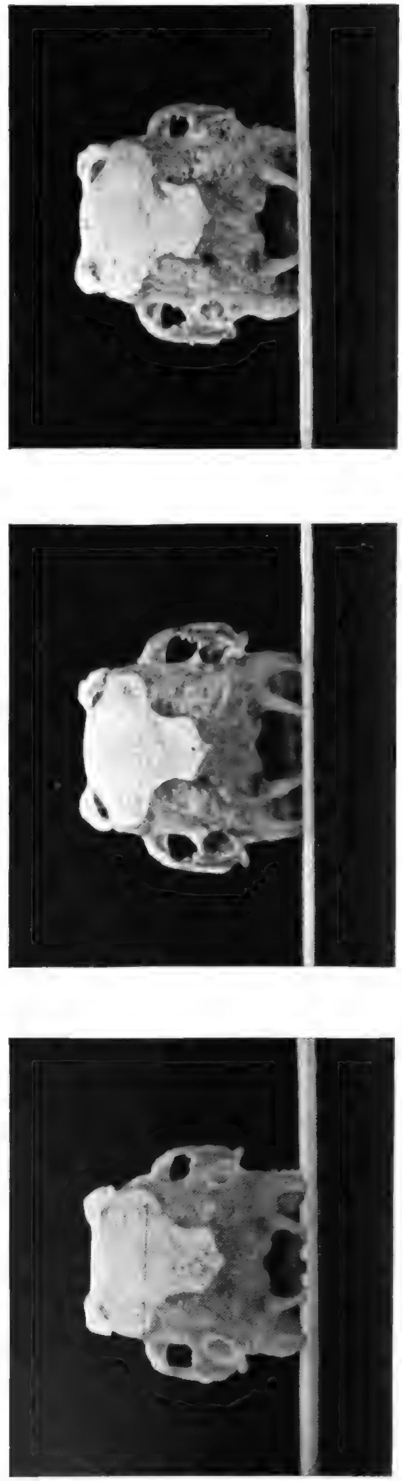


A B C

Fig. 17.—Anterior views of mandibles. Observe similarity of variation of *a* and *c* and contrast with normal *b*.



A B C

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teeth, in good condition, was selected for the test subject. The test food consisted of an ordinary lean corned-beef sandwich, (2½ inches by 3½ inches). This was masticated until it was involuntarily swallowed. The number of mouthfuls, and the number of chews per mouthful, and the time consumed, were all carefully noted, the force with which the teeth were brought together was estimated to be 10 pounds for each contraction of the muscles of mastication, which is a very conservative estimate.* The time consumed in leisurely eating the test food was about nine minutes, and, as has been stated, the estimated force was 7,050 pounds. A second person in making a similar test, required 52 contractions less than the former, but the meat was much more tender than in the first case.

If these deductions are at all accurate, the force exerted on the skull through the medium of the teeth over a period of time can be easily calculated, and will be found to be enormous. Thus we readily see how interfering with one side of the dental equipment in an animal can affect the shape and structure of the skull, for, according to the laws of evolution, we know that the continuous muscular force exerted on a given bone determines the shape of that bone.

I now wish to report on my experiments with another type of herbivorous animal, the sheep. For this experiment, two animals of the same birth were selected for the test, and for the control, I procured their mother. In the first animal I eliminated, as best I could, the function of the left lateral half of the dental apparatus, by cutting off both the maxillary and mandibular teeth on that side. In the second animal, the function of the right lateral half was interfered with by cutting off only the mandibular teeth on that side.† After seven months, the skulls were procured and the next series of illustrations shows the state of growth.

Fig. 19 is from a photograph of the lower aspect of the skull of animal No. 1. The drawn line extending along the sutures of the palate passes markedly to the left of the center of the foramen magnum. This shows an asymmetric growth of the skull which corresponds in a striking manner to that observed in the rabbit experiment, but, of course, here it is towards the

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*The amount of force required to crush food has been very carefully studied by two investigators: Dr. G. V. Black and Dr. Joseph Head. Dr. Black confines his work to the *direct* force required to crush food (see Dental Cosmos, 1895 xxxvii, 478-484) while Dr. Head directed his investigation towards the *trituration* of food (see Dental Cosmos, 1906, xlviii, 1189-1192). Both of these experiments were more to determine the crushing point of food than the amount of force required to masticate food; so, to estimate the force required to masticate a given article of food, the number of closures of the jaws must be considered.

The following table shows the comparative results of these two investigations in crushing meat. It will be noted that the trituration gives a lower crushing force, with one exception, than the direct pressure:

	Dr. Head lbs.	Dr. Black lbs.
Corned beef	18-22	30-35
Tenderloin of beefsteak, very tender	8- 9	35-40
Round of beefsteak, tough	38-42	60-80
Roast beef	20-35	35-50
Boiled Ham	10-14	40-60
Pork Chops	25-30	20-25
Roast Veal	16	35-40

†Owing to the fact that after the operation, the animals did not thrive in confinement, they were sent to the country for board, where it was impossible to have them under as close observation as they should have been, and, unfortunately, during this time, the posterior molars erupted and were functionating, so that the outcome of the experiment was interfered with. Nevertheless, the results are worthy of note.

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Fig. 19.—Lateral asymmetric development of skull of sheep due to interference with the occlusal forces of the left lateral half of dental apparatus.

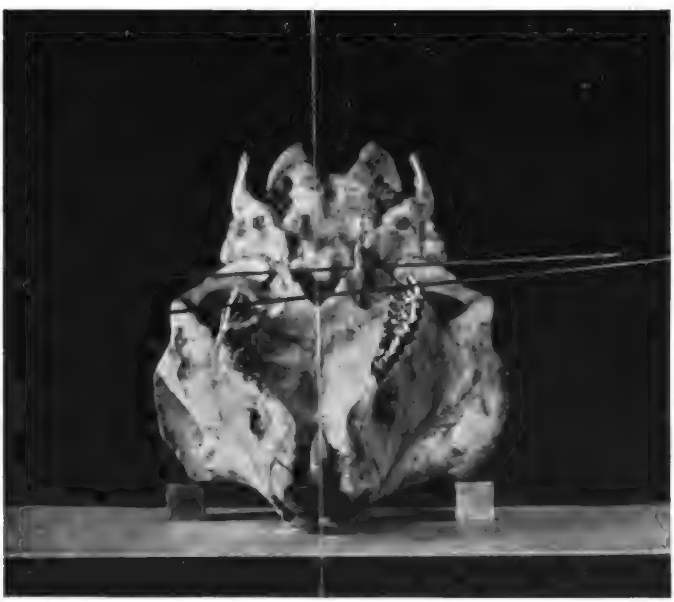

Fig. 20.—Vertical asymmetric development of same.

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opposite side, for in this instance the left lateral half of the dental apparatus is interfered with, while with the rabbits the right lateral half was operated on.

Not only was the growth of the skull distorted in the lateral plane, but, as shown in Fig. 20 there was also a vertical distortion as well. (The vertical measurements were made with long steel wire pins, one resting on corresponding depressions of the articular surfaces of the glenoid fossæ, the other pin

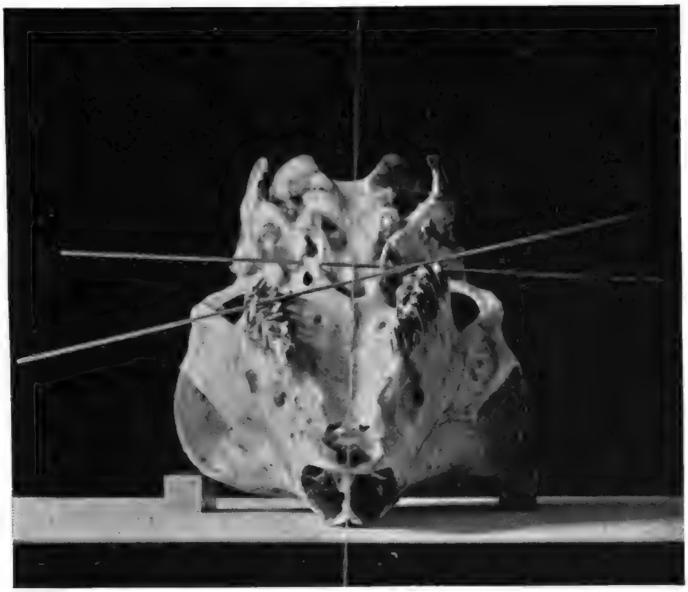

Fig. 21.—Vertical asymmetric development of sheep No. 2. due to interference of only the lower right teeth. (Contrast with Fig. 20.)

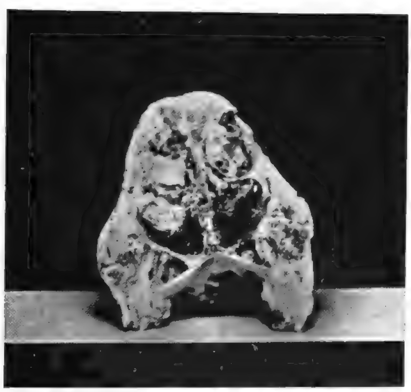

Fig. 22.—Section of skull No. 2.

resting on the corresponding depressions of the corresponding molars. The latter points, I consider as accurate as could be obtained, for, as stated in the footnote, page 273, the posterior molars erupted during the experiment and their function was not interfered with.)

Fig. 21 is of the skull of animal No. 2 and corresponds with Fig. 20 of animal No. 1. It will be remembered that in this case the interference was

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confined to the mandibular teeth of the right side and that the maxillary tee were not interfered with during the experiment. Here it is observed that t nonfunctionating teeth, with their alveolar process, have elongated to a mark degree, and that the skull in the region of the temporomandibular articulati is twisted in the opposite direction, as indicated by the steel wire resting the glenoid fossæ. This vertical twist of this part of the skull correspon well with that in animal No. 1, but, of course, in the opposite direction, becau of the interference with the opposite side.

There is in this experiment one fact which I cannot account for, and th is, in animal No. 2 there is very little lateral twisting of the anterior part the skull, while in animal No. 1, it is quite marked. I now realize that would have been better had I interfered with both animals in the same way, I did in my rabbit experiment.

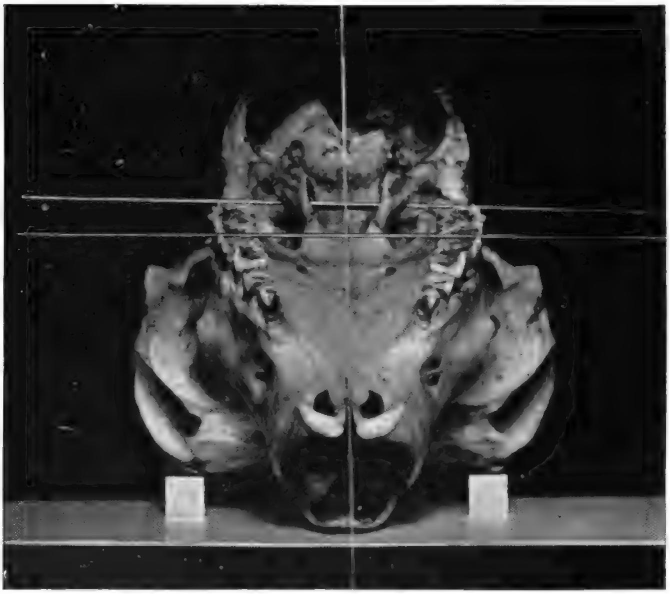

Fig. 23.—Normal growth of control sheep.

Fig. 22 is a section through the 3rd molar region of animal No. 2. He again, the vertical distortion is plainly visible. This view, furthermore, show that there has been an arrest in the development of the palate in both breadt and thickness of the right, or nonfunctionating side. This lack of growth is n confined to the palate alone, for the breadth of the entire right lateral ha is less than that of the left, or working side. The observer can test this him self by measuring from the nasal septum to the external surface of the bone

Fig. 23 is of the control and shows normal development.

I now present for your consideration a partial report of an experime on a dog.* I greatly regret that this report is not complete; the incomplet

*Dr. Richard Landsberger of Berlin, Germany, in investigating the influence of the eruption the teeth in the development of the maxillary bones and nasal cavities, removed from very young do one lateral half of the dental apparatus and found that not only was the growth of the maxillary bon and nasal cavities affected, but much to his surprise, found that the removal of the teeth had broug

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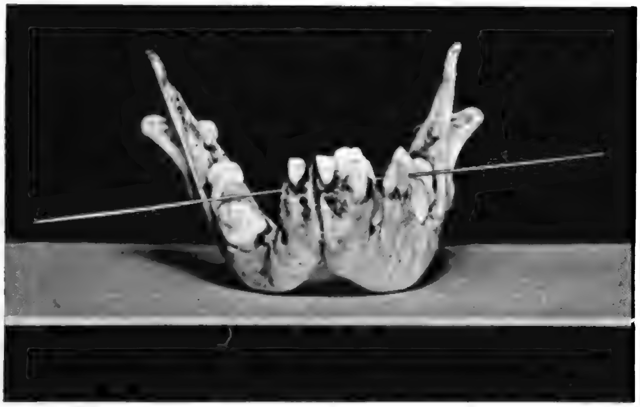

Fig. 24.—Anterior view of mandible of dog, showing lack of development due to interference with occlusal forces of the right lower teeth.

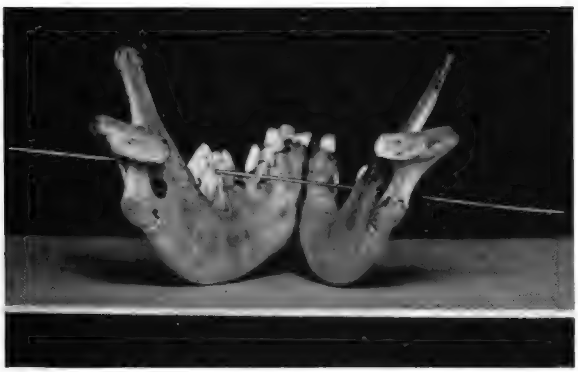

Fig. 25.—Posterior view of Fig. 24.

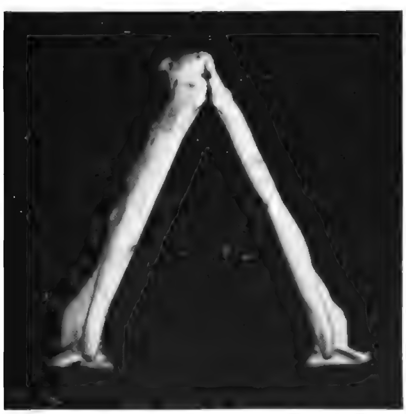

Fig. 26.—Observe the asymmetric development in the mandible of the cat, due to the removal of the mandibular teeth on left side.

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about an asymmetric development of the entire skull. See "Der Einfluss der Zähne auf die Entwicklung des Schädels" von Dr. Richard Landsberger, Berlin; ein Vortrag gehalten auf der Versammlung der Physiologischen in Berlin, December 11, 1911. Arch. f. Anat. u. Physiol., 1912. Compare with my "Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull". Read before the American Society of Orthodontists at Denver, Colo., July 13, 1910, and published in the *Items of Interest*, February, 1911, xxxiii, No. 2.

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Fig. 27.—Skull of same dog. Observe the vertical distortion.

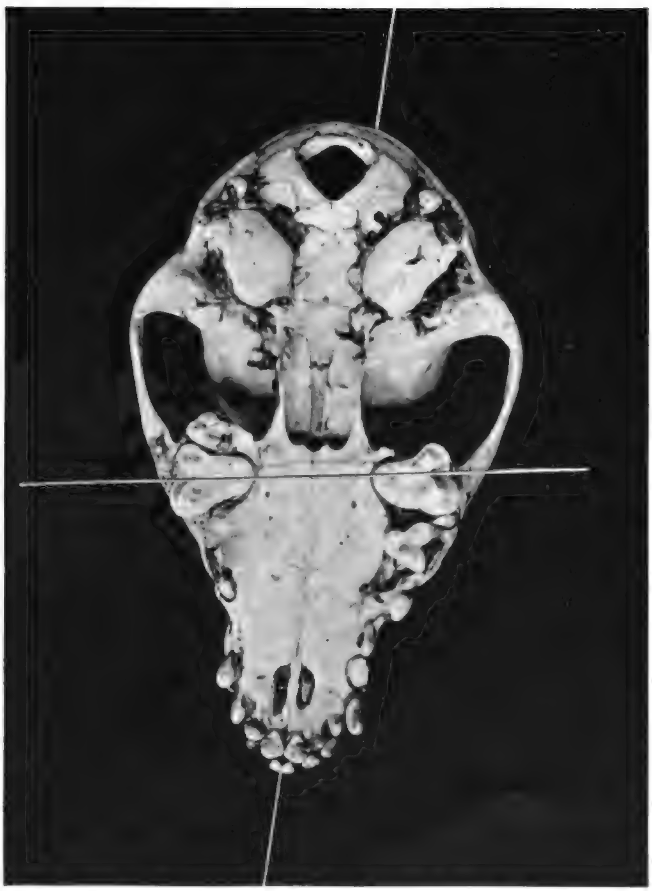

Fig. 28.—Same lower aspect. Observe the lateral twist of anterior part of skull.

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ness is owing to the fact that, in spite of the best of care, the entire litter, including the control, died before the prescribed termination of the experiment.

In this particular animal, I interfered with the function of the mandibular teeth on the right side. After four months and fourteen days from the date of the operation, the skull was obtained and the following illustration shows the state of growth. Figs. 24 and 25 are of the mandible. It will be observed that among other changes in the body of the bone, the condyle of the non-

Fig. 29.—Observe the asymmetric development of the bones of the skull of a dog due to the interference with the function of the upper left lateral half of the dental apparatus.

working side is less well developed than that of the noninterfered-with side. (Compare with Fig. 17 rabbit experiment.)

To me it seems remarkable that there should be such a bone change in so short a time, especially as, during this period, the posterior molars erupted and were functionating. (The condition of the animal prevented etherization and no second interference was attempted.)

Fig. 26 is here introduced to show the effects of the *complete* unilateral elimination of the dental apparatus in the mandible of the cat. This specimen does not strictly belong to this series, but it so beautifully shows the result of functional interference that it is worthy of consideration.

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Fig. 27 is an anterior view of the dog's skull, and here a vertical distortion is manifest. Fig. 28 is of the lower aspect. The line drawn along the intermaxillary suture passes to the right of the foramen magnum, showing that the anterior part of the skull had already begun to deviate.

The knowledge acquired during this preliminary experiment on the dog stood me in good stead in the next dog experiment, the results of which are shown in Figs. 29, 30 and 31.

It will be observed in Fig. 29, which is of the lower aspect of the skull,

Fig. 30.—Upper aspect of Fig. 29.

that in this animal I quite successfully eliminated the function of the teeth of the left (right side in the photograph) lateral half of the maxillae. The effect of this consequent unilateral function of the forces of occlusion is clearly demonstrated by the deformed skull. (The mandibular teeth were not experimented with.)

Fig. 30 shows the upper aspect of the same and it will be noted that the deformity extends throughout the entire skull. In fact the deformity was so excessive that during the experiment, the animal man, a most conscientious individual, came to me in a distressed state of mind saying, "that something was wrong with the head of one of my animals, for it was becoming badly

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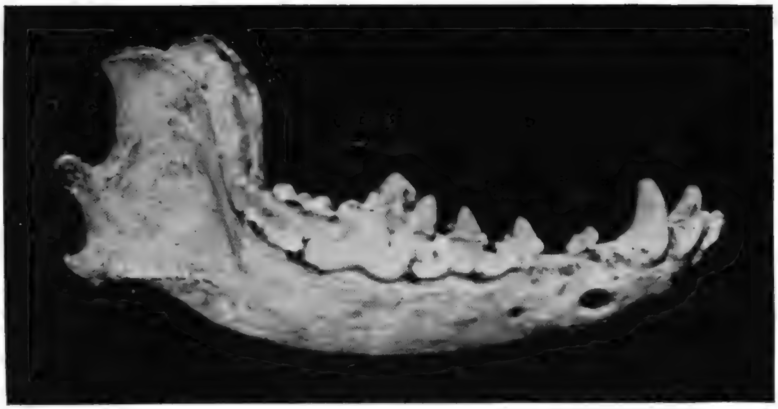
twisted, and that one of its eyes was growing out of place." It was needless to say that this information pleased me, for it showed that my interference with the occlusal forces was bringing about tangible results.

The effect of this unilateral interference with the maxillary teeth had an interesting effect on the mandibular jaw (which, as before stated was not interfered with) for aside from the results observed in all the other mandibles of the operated-on animals there was excessive atrophy, or lack of development



A

B

Fig. 31.—Mandible of skull shown in Figs. 29 and 30. Compare the development of the alveolar process in *A* and *B*. The atrophy of the process in *B* is worthy of note and is due to lack of use, the upper left lateral half of the dental apparatus being removed.

of the sockets of the teeth on the nonfunctioning side so that these nonfunctioning teeth were beginning to show signs of loosening. This condition is illustrated in Fig. 31*b*.

There is still another group of animals that should be included in these researches, and it is the primate group. As a matter of fact, I have already attempted to work on these animals, but have never been able to get results, for they are so delicate that they did not long survive in our changeable New England climate. It has been one of my cherished hopes to make a trip to

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the tropics and carry on my researches with these animals; but I see no prospects of making this extended journey, so I would therefore be grateful if any reader from these regions would carry on these interesting experiments for me. I would be glad to send them the necessary instruments and help them in any other way that is in my power.

In conclusion, I wish to state that, although I have been working at this problem for a number of years, it has progressed very slowly, due largely to the fact that each experiment extends over so long a period of time, and also because it is a very difficult matter to completely eliminate the functions from one lateral half of the dental apparatus. The persistency with which Nature adapts the occlusion of the interfered-with teeth for use is remarkable, and strongly points out the importance of the dental apparatus in the scheme of life.

I fully realize that a hostile observer could criticize this work, as far as I have carried it, as being incomplete; but those who are familiar with the biology of bone growth, and who appreciate that muscular action, blood supply, and cellular activity are all bound together in bone development, will, I think, appreciate the significance of this line of investigation, and will perceive its importance in the development of the bones of the head and the organs incased therein.

The fact that my investigations are, perhaps, another reason for making the general practitioner appreciate the far-reaching influence of preserving the deciduous dentition which serves during the important developmental period of childhood; and also that orthodontists are referring to it as a plea for the establishment of the occlusal equilibrium early in life, stimulates me to carry still further this slow and patient work.

DISCUSSION

Dr. Milo Hellman, New York City.—I would like to ask Dr. Baker a question. I should like to know how the teeth were mutilated in the last dog.

Dr. Baker.—The function was interfered with by extraction. In the other group of animals, namely the rabbit and sheep, I found by working on dead animals, that the teeth were so firmly rooted, it was impossible to extract them without causing serious damage, so I had to resort to frequent incising of the teeth.

Let me add, the animals received most excellent care. The various operations were performed under an anesthetic, and the care-taker saw to it that they received the best of food and shelter—in fact as Dr. Cannon said—"nowadays we treat our experimental animals better than our patients."

Dr. A. LeRoy Johnson, Boston, Mass.—Dr. Baker has given another demonstration of the law formulated in 1884 and 1885 by Julius Wolff, known as Wolff's Law. It reads:

"Every change in the form and the function of a bone or of their function alone, is followed by certain definite changes in their internal architecture, and equally definite secondary alternations in their external conformation, in accordance with mathematical laws."

The impression one gets from Dr. Baker's demonstration is, I think, misleading. We cannot believe, and no evidence has been presented to substantiate the belief, that the form of the human head, more especially the brain case, is solely determined by the pull of the

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muscles of mastication. Phylogenetically there is a correlation between the size and form of the brain case and the muscles of mastication, particularly the temporal, but a correlation does not necessarily designate a cause. Moreover, except under pathologic conditions osseous tissue will not impinge upon nervous structures, the latter are physiologically dominant. Thus, while we recognize the action of the muscles of mastication as factors in the development of the head, it is not reasonable to give them too much emphasis. In fact, the validity of the universal application of Wolff's Law is at present being questioned. I refer to the work of Mark Jensen on "Bone Formation."

Dr. Victor Hugo Jackson, New York City.—With reference to the experiments made in shutting off the air from one nasal opening, Zeim, of Germany, in his experiments on growing animals, to determine the cause and effect of nasal stenosis, obstructed one nasal orifice, thus withdrawing the normal nutrition from that one contrasting it with its fellow.

As a result, which illustrates the effect of stenosis on the development of the bones, there was observed a deviation of the intermaxillary bone and the sagittal suture towards the occluded side, a shortening of the nasal bone, frontal bone, horizontal plate of the palate bone, flattening of the alveolar process, and a reduction of the distance between the auditory canal and the alveolar process, as well as between the zygomatic arch and the supraorbital-border. (Jackson Orthodontia, Page 30.)

Dr. Lawrence W. Baker, Boston, (closing).—I quite agree with Dr. Jackson in that shutting off the air from one nostril will bring about an asymmetric development of the bones of the skull. Dr. Willis S. Anderson, in our country performed a similar experiment and brought about, not only a marked bony change in the skull, but also his experiments caused, through lack of proper oxidization of the blood, many far-reaching effects on the growth of the animals. I strongly advise all to read the report of this classic experiment which was read before the American Laryngological, Rhinological and Otological Society at Atlantic City, June, 1909.

I am glad Dr. Johnson has emphasized the fact that there are other forces which contribute to the development of the skull other than muscular force. No doubt I have laid so much stress on muscular force, it may be I have unconsciously misled you. However, in my introductory remarks I stated there are two great groups of forces at work which combine to determine skull form—one group operating from within, while the other group operates from without. However, I think all will agree with me in that muscular force is a most important factor in the latter group, and that the bony changes were brought about primarily by my interfering with the occlusal forces, which after all are in reality nothing more or less than the reaction of the forces of the muscles of mastication.

Dr. J. Lowe Young, New York City.—Take one of these puppy dogs and feed him on milk. As long as you keep him alive he does not chew anything, and see what you get. Do not touch his teeth.

Dr. Baker.—What do you think you will get?

Dr. Young.—I don't know anything about it. (Laughter.) I want you to find out.

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A COMPLETE CLINIC ON ORTHODONTIC ENGINEERING*

By Lionel Hartley, D.D.S., New York City

THE advantages of surveying the models of orthodontic cases are many, the principal *one* being the elimination of 95 per cent of the guess work, in which we are compelled to indulge.

By using some method of surveying combined with engineering, we are enabled to get an accurate drawing of both the maxillary and mandibular teeth, separate and in combination, showing the existing quantity of tooth substance in both jaws in occlusion, or in as near occlusion as it is possible to put any particular set of teeth. (This gives us a positive knowledge before we start our work, instead of a long time after.)

We are enabled with mathematical accuracy to ascertain the *minimum* amount of tooth movement necessary to put the entire denture into occlusion and by superimposing the drawing of the teeth in malocclusion, on that of the drawing of the teeth in occlusion, we know at a glance the amount of movement necessary for each individual tooth and can design appliances which will effectively do the maximum amount of work, with the least amount of discomfort to the patient.

We have an accurate check on the progress of our cases and can see whether our appliances are doing the work imposed upon them, by making progress surveys at stated intervals.

In so-called "open bite" cases, accurate *vertical* surveys can be made and by drawing the line of the compensating curve and the line of occlusion we can accurately show on paper, the amount of supra- or infra-version (as the case may be), of each individual tooth.

The apparatus I use consists of a leveling table for the models and a combined surveyor and pantograph, which simultaneously surveys, projects and enlarges the drawing five diameters. (The object of enlarging five diameters instead of exact size or ten times, is because in the former size the drawings are too small for correct calculations and in the latter size, the enlargement is too great to be within the angle of vision of normally sighted individuals.)

The surveyed points of projection are then joined by hand with pen and ink on tracing paper.

The landmarks that are surveyed are the gingival circumferences, the grooves and sulci, the cusps and ridges of each tooth and the rugae.

The mesiodistal diameters are measured on these surveys and marked on two wires, (representing maxillary and mandibular jaws).

The surveys of the maxillary and mandibular first molars are fitted into occlusion and the amount of overhang and overlap measured. These points become points of fixation in joining the wires with the mesiodistal diameters marked on them. It then becomes possible to design an arch within anatomical limits, with a reasonable overbite, provided the tooth substance in the maxillary and mandibular jaws match.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27, 1921.

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THE PROBLEMS OF MODERN ORTHODONTIA*

By Dr. James T. Quintero of Lyons, France

(Translated by Margaret Gortikor, D.D.S., New York)

I WANT to tell you how greatly I realize the responsibility you have placed upon me. The tasks which confront us are numerous and various. Should I not choose and invite the best scholars and orators capable of teaching us to prepare something for our annual meeting thereby guiding us in our discussions to produce truth, eliminate the false, and emphasize the facts that are the most important with useless details placed in the background? All this requires authority and prestige, qualities which others might possess better than I. Still all this may not be possible if one limits himself to a definite line of conduct. Let us try to find out today what our young Society can do toward advancing our specialty. Orthodontia has a definite purpose and certain needs.

The needs of modern dentofacial orthopedia are numerous. It is nearly two hundred years since our forerunners Fauchard and Bourdet accomplished their aims. It is no longer merely a question of how nicely we can bring the teeth into alignment, but we must determine the condition of each maxillae, their relationship to each other, to the face, to the alveolar borders and to the teeth. We must examine the alveolar process and the teeth in regard to their relationship to the surrounding parts. Then we must decide in what respect each part is abnormal and consider the methods of treatment and try and choose the best. What are the fundamentals of our work? We do not exactly know what a normal maxilla, a normal denture or a normal occlusion is. Notwithstanding this, do not these very points form the basis of our specialty? How can we claim to perfectly correct dentofacial malformations when we do not possess an accurate knowledge of the normal conditions we should produce? I want to recall to your mind the work of Bonwill and of Hawley, who originated certain ideas, remarkable though their work be, still it is far from perfection and even though they may have constituted a very important step of that epoch, today their ideas are insufficient. The same criticism can be made of more recent work. In France we have scholars, men such as Crois, Siffae and Pont. Each one has contributed a part toward the construction of this edifice but still we have not attained our end. Here, now, is the first object toward which we can direct our combined activities.

Let us look into the future. Having determined what is normal in a particular case and the relationship of the regions we are interested in, we should know how the case deviates from the normal. We must have a language and terminology which will describe the malocclusion. Even now, France has contributed much toward the advancement of our specialty. I need only mention the works of Frey, Lemiere, Bogo de Nevrize and Villian, as

*Read before the Société Francaise d'Orthopédie Dento-Faciale, Lyons, France, session of May 22, 1921.

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they are well known to you all. Can it be that we are not progressing? It is hardly probable because the uncertainty of new discoveries is proportional to the progress of our science. We have here a second field of investigation before us.

Let us advance another step. Having studied the various irregularities of the case, we must eliminate from our minds the minor details and consider only the principles that enable us to make a diagnosis, that is to classify the case as it deviates from the normal. Shall we follow the classifications brought over from America, as Angle's, later modified by Lischer, a modification which deals with terminology that does not change the fundamentals? The latter classification of Calvin S. Case, likewise based on that of Angle is no more satisfactory to the scientific spirit of the French. We therefore, find ourselves confronted by a third problem that must be solved.

We can still go farther and ask what type of appliance should we adopt? Ought we, like the Americans, endeavor to make the appliances small and delicate with a slow, continuous action; more physiologic, if the term may be thus employed, less annoying because of their form and position; or on the other hand, should we imitate the Germans who tend to make their patients wear heavy, bulky appliances which have a rapid action but produce more pain? Should we give preference to a fixed appliance or removable appliance? What should we decide upon in reference to retaining appliances? We have a great many questions of the most pressing nature for those who always want to work a little better. There are many points of doubt which demand prompt and definite answers in order to permit each one to solve his own problems with the least amount of hesitancy and uncertainty.

I have mentioned only the practical points that are the most urgent. There are other problems such as instrumentation, tools, material and operative technic, other questions solicit the attention of those who are attracted by the work for the sake of science.

Among the latter questions can be mentioned the tissue changes during orthodontic treatment, the influence of the endocrin glands and the disturbed functions of the same as well as the part played by heredity in different forms of malocclusion. We have the problem of the stress sustained by the various parts of the appliances, the proper size for each to resist the forces and to transmit same to the malposed teeth including the question of the best alloys found in the construction of the appliance.

Many of these investigations require well equipped laboratories, which few of us have at our disposal.

Are any of the problems I have just enumerated completely solved? We should admit our ignorance in regard to all of these big problems of dentofacial orthopedia as well as problems of biology in general. Who will give us the key to all of these mysteries? I believe the solution is still far off, but it behooves each of us to do all within his power to help overcome these difficulties by bringing to this Society the facts known and always seeking to improve yourself and thereby be able to render better service to your patient.

Gentlemen: I now open the first meeting of the "French Society of Dento-Facial Orthopedia."

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PRESENTATION OF MODELS AND APPLIANCES

One Case of Fracture of Maxillary Central Incisor Corrected by Regulating*

By Dr. M. H. J. Harwood, Lyons, France

(Translated by Margaret Gortikor, D.D.S., New York)

MISS M., age sixteen years, while playing, broke off the incisal edge of her maxillary central incisor, presented herself at my office. There were two solutions, devitalize the tooth and replace it with a pivot tooth aligned with the approximating teeth or (as I had already done in a similar case) add an enamel tip supported by two pins which penetrated the dentin but still not interfering with the vitality of the pulp.

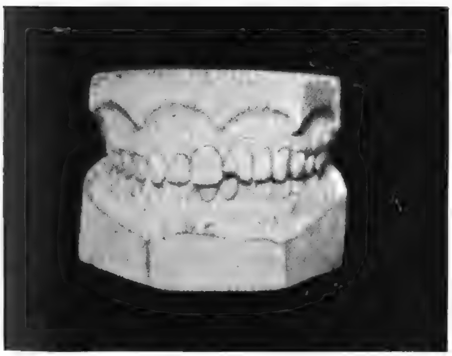

Fig. 1.

Fig. 2.

Because of her age, the parents objected to the use of a pivot tooth. The enamel tip might change color, due to long use, lose its gloss as frequently happens with plastic enamel. Therefore, another method was devised.

In the treatment of malocclusion, we are obliged to move teeth in an occlusal or gingival direction. I thought that by applying those two movements I might be able to compensate for the difference in length between the fractured tooth and the approximating tooth.

It will be noticed (Fig. 1) that the fractured tooth overlaps the approximating central, which caused us to begin by correcting the direction of its long axis. This was brought about by the appliance shown in Figure 2.

A band with a gold wire, soldered vertically to it, was cemented on the tooth, each end of the wire being bent into a hook. The bands with tubes were cemented to the first molars which served to support a labial wire. To the

*Read at the meeting of the Société Francaise d'Orthopédie Dento-Faciale, Lyons, France, May 22, 1921.

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labial wire are soldered the hooks, which are connected to the gold wire hooks soldered to the incisal band by means of rubber ligatures. This device produces a reciprocal movement thus changing the direction of the vertical axis of the tooth.

The rotation is then obtained by the standard use of the double ligature and in this way the tooth falls into the line of occlusion. The labial wire was then replaced by another wire resting at the gingival margin of the teeth. The anterior part of the labial wire supports a second wire which is near the incisal edges. (Fig. 3.)

Fig. 3.

Fig. 4.

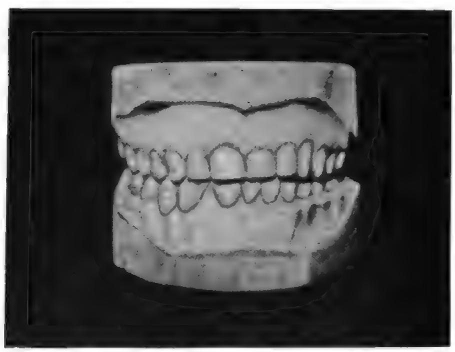

Fig. 5.

To the neck of the fractured tooth (left central incisor) a wire ligature is attached and the free ends of the ligature are twisted around the lower wire. By twisting the wire, the tooth is drawn down by degrees. At the same time another wire ligature which surrounds the middle third of the right incisal crown, has its free ends twisted around the upper wire. Gradually this tooth is drawn up until finally both teeth are the same length.

In moving the fractured tooth, the line of fracture which was oblique at first, became almost horizontal. It required very little grinding to straighten the edge.

The next question was to retain the teeth in position. I preferred to let each tooth be as independent of the other as possible. Instead of holding the

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teeth by the use of two bands soldered together, the band for each tooth is absolutely separate. The band on the right incisor has a small ring into which fits a small stem which is soldered to the band on the left incisor. The appliance exerts a little spring so that any tendency on the part of the teeth to return to their former position, is opposed. (Fig. 4.)

This retaining appliance was left in position for a year without any change being produced.

The last model (Fig. 5) was made one year after the removal of the retaining appliance; according to recent information—for the patient has left Lyons—no change has taken place. A slight difference will be noticed at the gingival border of the tooth which was drawn down.

TRANSPALATINE ARCH*

By Dr. James T. Quintero, Lyons, France

(Translated by Margaret Gortikor, D.D.S., New York)

THE appliance that I am showing is distinctly derived from Mershon's lingual arch. It sometimes happens, when we are confronted with certain types of malocclusion in which there is a close bite, that a lingual wire can-

Fig. 1.—Transpalatine arch with auxiliary springs.

not be made to occupy the correct position as it will interfere with the occlusion of the mandibular anterior teeth.

All these cases are very troublesome to me, because I have abandoned the use of all appliances, except Mershon's arch, a long time ago, and so I am obliged to look elsewhere for a solution and the results of this searching I am showing you today.

In almost all the cases we have to treat, the malocclusion consists of one principal trouble, namely, maldevelopment of the maxillae. We must combat this condition first, before we can hope to obtain a definite result from ortho-

*Presented before the Société Francaise d'Orthopédie Dento-Faciale, Lyons, France, May 22, 1921.

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dontic treatment. It little matters whether we correct the torsiversions and linguoversions unless the dental arch is the proper size. It is not until the size of the arch has been remedied that we can consider secondary corrections; that is, the various malpositions which a small number of teeth assume. In order to obtain expansion, what must be done? A slow and gradual pressure must be exerted upon the lingual surface of the teeth. We obtain this pressure by constructing an appliance anchored on the molars and having a socket with a lock. The appliance, instead of being weak because of the long irregular curve it makes in passing around the entire dental arch, acquires strength by the passing directly across the palate from the anchor tooth on one side to the one on the opposite side, thus making a short appliance. If you wish to obtain expansion, not only of the anchor teeth but also of the other teeth on either side, two methods are available, we can use spurs soldered directly to the bands or we can use, as in the model of the cut, auxiliary springs passing from the anchorage socket and directed horizontally forward to the last tooth we wish to expand.

This method permits of an expansion indiscriminately whether it be of the anterior teeth or of the posterior, all depending upon the type of irregularity with which we have to deal. This is done simply by modifying the strength and action of the springs on the main appliance.

TREATMENT OF A CASE OF A MALERUPTED CANINE BY A LINGUAL APPLIANCE*

By Dr. B. de Nevrèzé, Paris, France

(Translated by Margaret Gortikor, D.D.S., New York)

THE case which I will present to you is characterized by two malpositions: (1) In a transversal or frontal sense by a maldeveloped maxillae.

(2) In an anteroposterior or sagittal sense by linguoversion of the two maxillary right centrals.

This double lesion has caused the space necessary for the maxillary right canine to partially close up and cause the canine to erupt in infralabioversion. (Figs. 1, 2 and 3.)

The only difficulty in treating this case was that the patient objected to any visible appliance, despite the fact that she was only 15 years of age and so had no social obligations of importance.

The lingual appliance was particularly indicated and the cuts show that I employed it in two forms in an absolutely individual manner.

The first form of lingual appliance (A) was constructed with two auxil-

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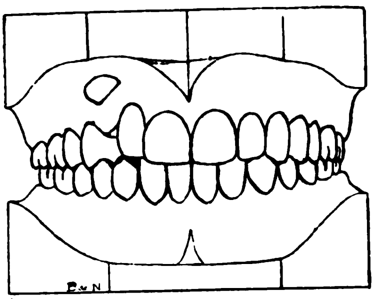

Fig. 1.—Front view of model before treatment.

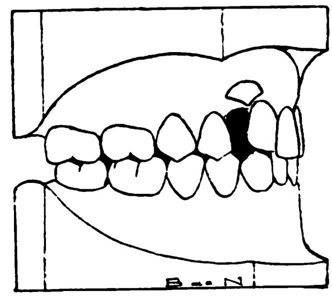

Fig. 2.—Side view of model before treatment.

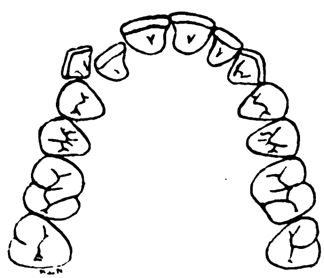

Fig. 3.—Occlusal view of model before treatment.

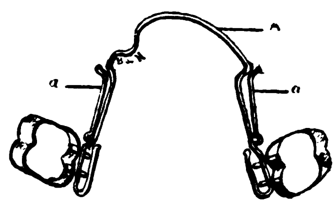

Fig. 4.—First form of appliance. *A*, Lingual Appliance, *a*, *a'*, Auxiliary springs.

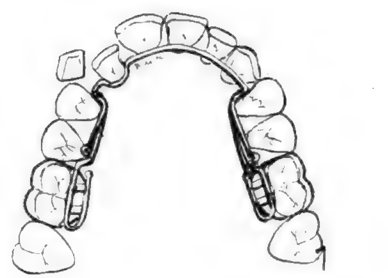

Fig. 5.—First form of appliance in position.

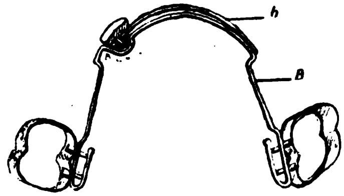

Fig. 6.—Second form of appliance. *B*, Lingual appliance, *b*, Auxiliary spring.

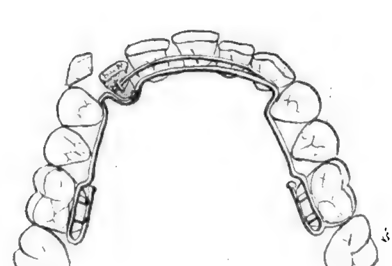

Fig. 7.—Second form of arch in position.

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iary springs (a and a′) which rested on the necks of the premolars. These springs widened the premolar region to the extent determined by Ponts indicator.

Second form of lingual appliance. (Figs. 6-7.) A second lingual appliance (B) replaced the first and had but one auxiliary spring (b) which pushed forward the two maxillary right incisors.

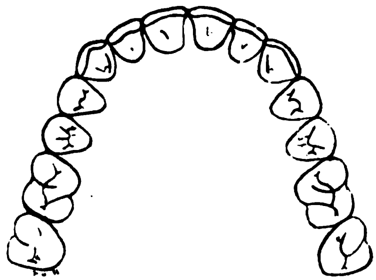

Fig. 8.—Occlusal view of model after treatment.

The space necessary for the eruption of the maxillary right canine in its proper position was obtained in 6 months. (See Fig. 8.)

(a) Without a visible appliance.
(b) Without any pain.
(c) Without loss of time (12 to 15 visits).

AUTOGENOUS SOLDERING OF BANDS IN DENTOFACIAL ORTHOPEDIA*

By Dr. James T. Quintero, Lyons, France

(Translated by Margaret Gortikor, D.D.S., New York City)

It is nearly ten years since I began experimenting with bands in view of eliminating all of the inconvenience of soldering that occurs. These inconveniences are of several types, first as regards strength, the bands always are weak at the point of soldering. Now as for soldering such as is practiced in orthodontia: a lump is formed greater than the thickness of the band and though very slight in nature, still it proves an obstacle to the patient when cleansing it and it is also a choice place for the accumulation of food and debris after mastication.

If you should attempt to grind or polish away the projection you will weaken the band greatly. Finally, the presence of this projection is unsightly and if it is large in size, it may prove to be a source of irritation to the soft tissues with which it comes in contact.

Thus by a series of experiments I have endeavored to determine the best

*Presented before the French Society of Dento-Facial Orthopedia, Lyons, France, May 22, 1921.

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methods for preventing these inconveniences. I am convinced that it is advantageous to abandon the use of common metals and the alloys ordinarily employed and use only precious metals in their stead. But the iridio-platinum which I employed so readily before the war, today is prohibitive in price and as for the alloys which formerly gave me the best results, they come from Germany. In addition, the autogenous soldering of platinum requires an oxyhydrogen blowpipe and besides the result might be doubtful. Thus I have decided to use naught else but 22 K commercial gold. It is easy to manipulate, solders easily, is malleable, very strong, does not oxidize in the mouth and to be brief, it possesses all the requisite properties.

Now let us proceed to the technic of autogenous soldering for it goes without saying that a band for orthodontic purposes cannot be made in the same manner as a crown. Ordinarily when you want to solder autogenously you measure the exact length of metal necessary to completely go around the tooth and then cut your metal slightly longer than the measurement, bevel one of the ends or sometimes both ends so as to form a bias joint. By heating

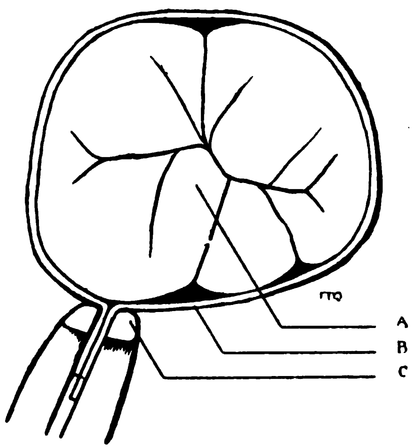

Fig. 1.—Formation of band. ***A,*** **Mandibular left molar.** ***B,*** **Gold band.** ***C,*** **Angle's pliers.**

the thickest portion first, due to capillary attraction, the heat is conducted along the molecules until it fills all the microscopic space which separates the ends to be united. This method is not convenient in orthodontia because it is impossible to obtain an accurate measurement because of the slight space necessary for passing the metal between the teeth. With children, it would be difficult to obtain the correct measurement even if the teeth were sufficiently separated to allow for the passage of a wire ligature between them.

When you wish to make a band for orthodontic use, the first step is to separate the teeth, not by means of discs which destroys them but by the use of silk ligature which displaces them without defacing them. Then you surround the tooth with a chosen metal and with the aid of Angle's pliers No. 123 (for making bands) which you grasp tightly when pulling the metal, you draw the band snugly around the tooth. (Fig. 1.) Then you solder the band, usually by placing over it a bit of solder sufficient to solder the joint.

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But, if you wish to solder it according to my method, after removing the metal band carefully from the tooth, you diminish the length of the band about 1 mm. by straightening one of the folds made with the pliers and then carry it further back so as to render the band smaller. (Fig. 2.) If the tooth is found particularly difficult to band, you can refit a second time by stretching the gold band with the pliers, but in either case you must always shorten the band before soldering. Then you cut the ends so that they do not exceed 2 or 3 mm. beyond the band and now holding it underneath with your pliers,

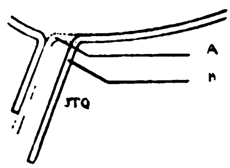

Fig. 2.

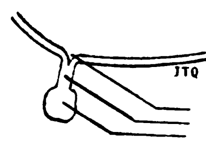

Fig. 3.

Fig. 2.—Shortening the band. *A*, Old fold. *B*, New fold.
Fig. 3.—Soldering the band. *A*, Empty V-shaped space. *B*, Joint soldered autogenously. *C*. Gold melted down during soldering.

making sure that it is in correct position and sides parallel, place it under the blowpipe. Now that the gold has turned red and the molten borax holds the two ends in place, grasp the bands opposite the joint in such a manner as to allow the edges to receive all the heat of the flame and watch for the fusing of the gold so that you can avail yourself of the moment when the joint becomes

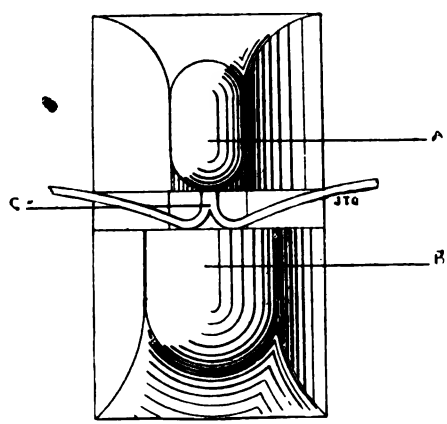

Fig. 4.—Eliminating V-shaped space. *A*, Round nose of pliers. *B*, Flat nose of pliers. *C*, Joint of the band.

filled with the molten gold. At this critical instant withdraw the band from the flame or you run the risk of melting it.

Upon closely examining a band thus treated, you will notice that the gold in fusing did not fill the gap completely but left a V-shaped space at the beginning of the joint. It is this defect that has caused me to look for a solution to the problem. The first few times I filled this space with solder, but then where is the advantage of autogenous soldering when you have to solder a second time?

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I have overcome the difficulty in the following manner (Fig. 4) and completely do away with the V space: You cut the ends so as to project a little more than 1 mm. away from the band, then grasp the band between the jaws of a pair of contouring pliers No. 130 and so you flatten the parts entering into the formation of the V-shaped space in such a manner as to abolish the space and so straighten it completely. This stretches the band about 1 mm. and it is in anticipation of this preceding technic that we must diminish the size of the band before soldering.

The remaining preparation is done in the usual way. You burnish the edges against the tooth and grind the internal surface of the band slightly so as to permit for greater adhesiveness of the cement; then polish with discs of varying fineness and end the operation by burnishing the surface with a burnisher.

What advantages justify the use of this new process?

First; there is an economy of material, then you avoid the use of solder, finally the scraps can be employed in the laboratory for casting since they consist of naught else but 22 K gold and no solder, but these advantages are only secondary in nature. The true benefit derived from this process is that the joint is as strong as the rest of the band, also this process makes it possible to do successive solderings for attaching all sorts of accessory parts to the band without fear of opening the joint during these operations. Then, coming to a detail, to be sure, but nevertheless a detail of importance to those who wish to work properly and do honor to their professional title, that is, that this process allows you to finish your band so that it appears to be cast in one piece and thus does away with any trace of a joint.

This process allows for the making of a very strong band. I have not yet seen a band made in this way, break at its joint. It is easy to make bands for anterior teeth by this method, the only difference being that you use a thinner metal and also before soldering you do not diminish its size as much as with a band of thick metal. Lastly, this process permits of making bands for crowns and bridges rapidly and there is no reason why they should not be as strong as those made by the usual method. I always have to mention the fact that I confine myself to dentofacial orthopedia and so have not contributed anything toward the perfecting of crowns.

Demonstration.

Autogenous soldering of bands.

Dr. James T. Quintero ended the meeting by giving a practical demonstration of his method of soldering, autogenously, bands for orthodontic appliances.

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DEPARTMENT OF

ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE ORAL SURGEON'S POSITION IN DISEASES OF THE MAXILLARY SINUS*

BY THEODOR BLUM, D.D.S., M.D., (PENN.), UNIVERSAE MEDICINAE DOCTOR (VIENNA)

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IN A paper entitled "Oral Surgery for the General Dental Practitioner,"† the following statement is found: "Dentists as well as Oral Surgeons (unless they also specialize in nose and throat work) will save themselves a lot of annoyance by only treating infections of the maxillary sinus of dental origin, otherwise they may drain a sinus for months while it is continuously reinfected through the nose or adjacent sinuses." An attempt will be made below to discuss diseases of the maxillary sinus of dental origin and to prove the previous assertion.

It is quite important to describe first, those deviations of the normal anatomy of the maxillary sinus which must be considered in their treatment by the oral surgeon. As a rule the apices of the maxillary second premolar and first molar are nearest the floor of the antrum. While the lowest part of the sinus is usually on the same level with the nasal floor, a marked absorption of the bone in that region will cause the formation of an alveolar recess or sinus (sinus alveolaris) which in extreme cases may involve the hard palate as a palatal recess or sinus (sinus palatinus) and extend mesially to even below the nasal floor. Then, of course, the apices of the first premolar and canine or even the two centrals may be quite near the sinus floor.

A small antrum is due to lack of absorption of bone, especially in the

* Read before the Meeting of the Bergen County Dental Society of New Jersey, March 13, 1922.
†Written by the author and published in the Dental Outlook, April, 1921.

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region of the alveolus and the anterior wall. Depression of this wall as well as the bulging externally of the lateral wall of the nose may also be responsible for the reduced size of the antrum. Retention of a third molar or a canine occasionally causes the same anomaly.

Complete division of the antrum by a vertical wall has been reported, but is very rare. If a maxillary sinus appears to be divided by a horizontal wall, the lower part is most likely a cyst and the upper part the antrum displaced by the former.

According to Hajek the most frequent causes of antrum disease are the infectious diseases and of these especially influenza. Less frequent are the ones which develop secondarily from diseases of the teeth, maxillae and after injury. Only the treatment of the second class, with few exceptions, belongs within the sphere of the oral surgeon. The acute cases, of dental origin, may be caused by an acute purulent pericementitis, acute periostitis and acute osteomyelitis. The symptoms of the first are well enumerated by Hajek as consisting of severe toothache, pain upon pressure, elongation, frequently accompanied by periosteal swelling, and later on, discharge of foul smelling pus from the nose. When the offending tooth is extracted a communication with the antrum is found. Referring to periosteal swelling as a sign proves that only rarely is there found an infection of the bone or bone marrow without involvement of the periosteum and vice versa, so that when acute periostitis is given as another cause, it is understood that the bone itself must be also involved to cause an acute infection of the sinus. Although at times a communication with the antrum is established upon the removal of a sequestrum which had formed after an acute osteomyelitis, the sinus itself may be found to be healthy. The chronic cases follow chronic apical pericementitis whether the result of dental treatment or developing without such. Hajek has shown that infection may not only travel through the antrum membrane into the sinus, but also through bone of various thicknesses. He saw only two cases where infected cysts had broken into the antrum. The author has seen only one case of this type namely, a follicular cyst originating from a supernumerary tooth, which during an acute attack had involved the maxillary sinus. Chronic empyemas associated with tumors, syphilis and tuberculosis are rare. Under traumatic causes must be mentioned fractures as well as foreign bodies.

The normal antrum lining consists of a thin membrane made up of stratified ciliated epithelium and a glandular and periosteal layer. The rhinologist rarely has an opportunity to see a normal antrum lining. The oral surgeon, however, more often brings it to view during the surgical removal of a tooth or root as well as at the time of a root amputation or when removing a tumor of the maxilla; it appears thin and shows a bluish hue. During an acute empyema, the antrum membrane is swollen and red and the secretion scanty in the beginning, while later on it becomes mucous and purulent in character. When diseased the membrane becomes thickened, loses its transparency and appears whitish. Upon opening into a chronically inflamed sinus the antrum membrane is often found covered by mucous cysts and polyps.

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The existence of a so-called hydrops antri is doubtful, only one case having been reported so far (Dmochowsky). By "hydrops antri is meant the accumulation of free serous fluid of inflammatory origin in the antrum where through a closure of the normal opening pressure within results in dilatation of the walls" (Hajek).

The most positive of both subjective and objective symptoms of empyema is the presence of pus in the antrum. Foul smelling discharge is characteristic of the dental origin. If the offending tooth is removed it usually disappears. It may drain anteriorly and be discharged through the nose especially when bending forward or may drip backward and then be eliminated through the mouth. The throat is usually dry and the discharge from it is especially noticeable in the morning but may also continue all day. Pain is especially typical of acute dental empyema when beginning as periostitis of the alveolar process or maxilla. There is also pain in the region of the frontal process of the maxilla and the patient complains of frontal headaches. He is conscious of a foul odor. If the sense of smell is diminished or lost, marked changes in the nasal chambers must have taken place. Nasal breathing through the affected side is impossible. The cheek will never be swollen or red unless the bone or periosteum has been primarily involved and diseased, when the mucous membrane of the mouth will also be swollen and red. Secondary involvement of the bone is extremely rare. Chronic distention, apparently of the antrum walls, but in reality of the outer plate of the maxilla in the region of the alveolus, buccally as well as of the palatal plate palatally, is due to the formation of dental cysts. They rarely develop within the antrum. In the author's case of this type cyst membrane was entirely surrounded by a bony wall. (Fig. 1.) Only in neoplasms occurs a true dilatation or distention of the antrum walls. In acute cases chills and fever are present.

In most cases, as previously stated, there will be a discharge of pus from the nose (coming from the middle meatus) or posterior into the nasopharynx. The discharge of pus, as a rule, appears at intervals. On account of the high position of the ostium, a definite period of time is required for the secretion to refill the antrum after having been emptied. Lowering the head encourages the flow of pus from the ostium although the possibility of it coming from one of the other sinuses especially frontal and anterior ethmoids must be excluded. If an alveolar opening is present, irrigation will reveal the presence of pus in the normal salt solution flowing from the nostril. If the ostium maxillare and accessory ostium are occluded by an inflammatory process, the antrum can be irrigated even through a small opening in the alveolar process by means of a return flow catheter. Transillumination as well as x-ray examination are quite important in making a diagnosis. Other methods used for diagnostic purposes like irrigation through the ostium maxillare or accessory ostium, through the punctured inferior or middle meatus belong in the field of the rhinologist.

One must always keep in mind that the maxillary sinus may contain pus without being actually diseased (pyosinus maxillaris). In these cases the antrum is a reservoir wherein the secretions most often of a diseased frontal

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sinus accumulate. Cysts of the maxilla particularly the ones in the molar region (Figs. 2 and 3) may give the impression of an empyema, especially so if the bony wall which usually separates the cyst and antrum has disappeared and only a membranous wall exists. In these cases pus may discharge from an oral fistula when the patient's nostrils are held closed and the patient is asked to blow through the nose. However, upon irrigation,

Fig. 1.

pus will appear through the fistula but none through the nose nor will there be a history of discharge from the nose or throat, unless nasal disease is present or the antrum simultaneously affected. Osteomyelitis of the maxilla as well as malignant tumors of the antrum must be differentiated.

In cases of maxillary sinus infection, especially of an acute nature, nonvital molars and premolars should surely be subjected to dental treatment first if a fair degree of success is to be expected, but even in vital teeth deep

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alveolar pockets should not be overlooked as an infection of the sinus can even take place through the bone. In the presence of an alveolar and palatal sinus, not only molars and premolars but also canine and incisors must be considered.

The treatment of maxillary empyema is based on the removal of the cause (diseased tooth, etc., foreign body) and the establishment of free drainage. Of the conservative methods, only two should be employed by the oral surgeon, namely, the operation through the alveolar process (Cowper) and

Fig. 2.

the one through the canine fossa. The radical methods of which the Luc-Caldwell operation and its modifications are mostly practiced at the present time, consist principally of the operation through the canine fossa with the establishment of a counteropening through the lateral wall into the nose. It belongs entirely within the field of the rhinologist although the author has often operated simultaneously with the rhinologist, each restricting himself to his own field.

The operation through the alveolar process may be difficult or contraindicated in such cases where the palate is high, when a considerable thick-

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ness of alveolar bone intervenes between the apices and the antrum floor. For obvious reasons a deep canine fossa as well as an outward bulging of the lateral wall of the inferior meatus will be a contraindication.

The main objection to an operation through the canine fossa is the possibility of cutting the blood and nerve supply of the anterior teeth as well as actually injuring the teeth themselves. The best view, however, can be obtained through this operation only. All the oral operations can be performed under local anesthesia. If a tooth or an old socket has been found

Fig. 3.

to be the cause of antrum disease, the socket (after removal of the tooth) must be enlarged without injuring the adjoining teeth. For better inspection, diverging incisions will have to be made buccally, the posterior one running backward and upward and the anterior one forward and upward. The soft tissues are now retracted and the outer wall of the antrum with antrum membrane removed with care so as not to injure the apices of the teeth. The contents of the antrum are now removed and if the membrane itself is covered with polypoid tissue it is thoroughly curetted but the membrane never entirely removed. The mucoperiosteal flap is now replaced and sutured into position and an iodoform gauze drain inserted through the alveolar opening.

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The iodoform drain is removed after forty-eight hours or earlier if necessary, and not replaced, so that the small alveolar opening may close as soon as possible. In the average chronic cases, this treatment including daily irrigation with warm normal salt solution either by the doctor or the patient, will be sufficient and the case discharged in about three to four weeks. Sutures are removed within five or six days. Should the secretion return at a later date and the antrum membrane again show signs of degeneration, a radical operation in cooperation with the rhinologist is indicated. While considering

Fig. 4.

chronic cases, the question of persistent openings into the antrum may be discussed. In some rare cases, the removal of the epithelial lining covering the tract followed by curettage of the same will be successful. The wound itself can be protected by a small piece of iodoform gauze placed over it and held in position by a figure-eight wire attached to the adjoining teeth or to an artificial plate or some mechanical appliance. Usually, however, the old time flap operation consisting of covering the opening, after it has been properly prepared, with a palatal flap and suturing it into position, is indicated. An obturator with a plug running through the opening into the antrum must be

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condemned for several reasons. If the patient refuses an operation, an artificial appliance covering the opening is advisable.

The treatment of all acute cases is, from the standpoint of the rhinologist, expectant, in other words, by irrigation. Only the dental cases form an exception as a tooth may have to be extracted, a periosteal abscess incised, a sequestrum removed or a foreign body taken out. The removal of a root should always be attempted through the socket from which it came by enlarging it

Fig 5.

as outlined before and attempting to locate the same by inspection or with an instrument. If not successful, irrigation is the next step, during which the root at times even appears through the nose in cases where the ostium is large and the root itself small. Should this method not succeed then the mucoperiosteal flap and removal of the outer antrum wall must be resorted to. In either case, if the antrum is healthy a piece of iodoform gauze placed over the wound and held in position by a figure-eight wire encourages the quick closure of the opening. If, during an operation the antrum membrane is exposed but not pierced, no further treatment is necessary. Should, how-

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ever, the membrane be pierced and the antrum opened into, it must be irrigated at the time of the operation if there was a possibility of debris entering the antrum. If dressing of the wound is indicated, the iodoform gauze must not be placed into the antrum but just so that it will cover the opening. In all these cases, the patient should be warned not to blow the nose for cleansing purposes, but only to wipe same, so as not to disturb the bloodclot and gauze.

The following cases of foreign bodies in the antrum may be of interest:

M. R., male, twenty-seven years of age (October 20, 1916), had been suffering from left maxillary sinusitis for several years. A radical operation was performed by a nose and throat specialist. There was also an opening into the oral cavity in the region of the premolars, through which opening, the patient was instructed after the operation to irrigate the antrum with a glass syringe. The opening naturally became smaller in due time, and the patient, who was a dentist, felt that the nozzle of the syringe was too long and proceeded to make a mark with a file at the point where he wanted to shorten it. While he did not succeed in breaking off the end at the mark, it did break off while he syringed the antrum, and remained in the antrum for seven years. When operating for its removal the piece of glass was found in a recess near the malar bone. (Figs. 4 and 5.)

E. M., male, thirty-four years of age (June 21, 1918), had antrum disease ten years ago, when part of an obturator was broken off in the antrum. Pus discharged from the nose and fistula in the right maxillary first molar. After removal of the rubber tube and curettage of the maxillary sinus the patient was discharged in due time.

It is quite difficult at times to establish the fact that some dental or maxillary condition is the cause of the inflammation of the antrum. But even if this is established, it will be necessary to have all the sinuses examined by means of the x-ray and have the nose, throat and sinuses thoroughly gone over by a rhinologist. If other sinuses, especially of the same side, are affected, a simultaneous operation by both the rhinologist and oral surgeon will be indicated. Acute and emergency cases are the exceptions. Inflammations of the maxillary sinus not of dental origin are cases for the rhinologist and not the oral surgeon. The patient's welfare must always be uppermost in our mind and, therefore, the statement expressed above should be generally recognized. It is unfortunate indeed that some antrum cases must be treated through the mouth. The natural opening of the maxillary sinus leads into the nose and the logical treatment, therefore, should be through the nose. It would be absurd on the other hand, if an empyema of dental origin were treated through the nose when the tooth or root must be removed and the sinus, therefore, can conveniently be drained through the socket without disturbing normal relations in the nose. While the rhinologist and oral surgeon can serve patients best in their own field, the careful cooperation of the two can only be of additional benefit to them.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

PLACING AND HOLDING FILMS IN THE MOUTH

PART 1: GENERAL CONSIDERATIONS. PART 2: TECHNIC BY REGIONS

BY HOWARD R. RAPER, D.D.S., INDIANAPOLIS, IND.

PART 1. GENERAL CONSIDERATIONS

THERE are more details in technic to be mastered in placing and holding films in the mouth than in any other department of radiodontic technic. The purpose of this paper is to teach some of the details.

In order that a dental radiographic image may not be distorted or false, three *positions* must be correct: (1) The position of the head, (2) the position of the x-ray tube, and (3) the position of the films in the mouth.

POSITION OF THE HEAD

When the patient is in a sitting posture (we shall not consider the recumbent posture here) the position of the head should be *straight up,* that is to say, the head should be in such position that the roots of the teeth are substantially vertical. Still another way to express the same idea, and perhaps the best way to express it, is to quote Simpson and say, "let the head be in such position that the *occlusal plane is horizontal.*"

It is hardly necessary to use a measuring device always to tell when the occlusal plane is horizontal. If, however, the operator wishes to make such measurement, as he may sometimes, particularly when the film is placed flat in the mouth, i.e., on a plane with the occlusal plane, he may do so by means of *"the Simpson occlusal plane finder"* (Figs. 1A and B).

The *Simpson occlusal plane finder* is, in principle, simply a flat plane equipped with a circular, or double, spirit level. The flat surface is held against the occlusal surfaces and incisal edges (Fig. 1B) and the head moved and tipped until the bubble of the spirit level registers center over the mark in the center of the circular spirit level.

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POSITION OF THE X-RAY TUBE

The angle of the x-ray can be varied in two ways: (1) *vertico-horizontally* and (2) *mesio-distally*. Figs. 2A and 2B illustrate variations of the *vertico-horizontal* angle. Fig. 2C illustrates variations of the *mesio-distal angle.*

We need no measuring device to measure the *mesio-distal* angle. This

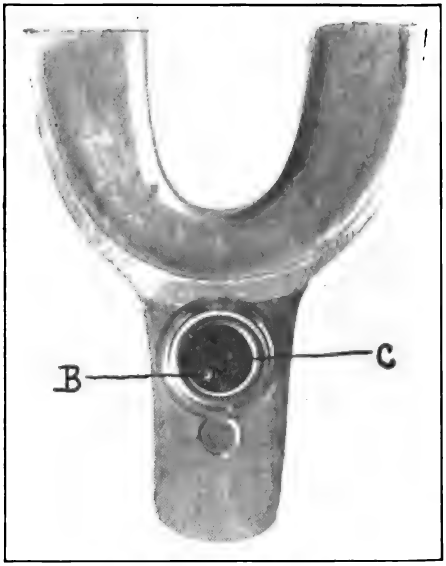

Fig. 1-*A*.

Fig. 1-*A*.—Simpson Horizontal Occlusal Plane Finder. (A "home-made" one. *B*, bubble in the circular spirit level; *C*, center mark in the spirit level.

Fig. 1-*B*.

Fig. 1-*B*.—Occlusal plane finder in use. The head is tipped and moved until the bubble in the circular spirit level registers center.

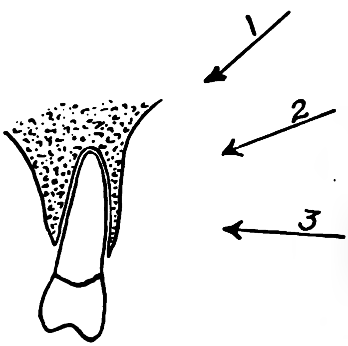

Fig. 2-*A*.

Fig. 2-*B*.

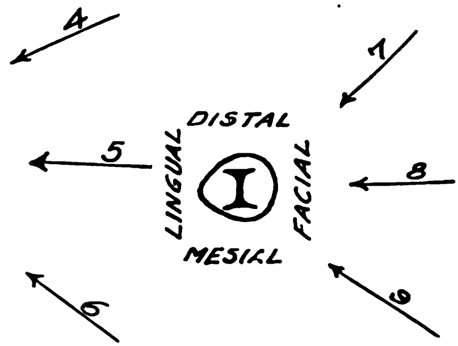

Fig. 2-*C*.

Figs. 2-*A* and 2-*B*.—Illustrating variations of the *vertico-horizontal angle;* also spoken of as the "*vertical* angle." (These angles are called the *vertico-horizontal angles* because they vary from the horizontal toward the vertical; they are designated as *vertical angles* because they are all in the same plane, i.e., a vertical plane.)

Fig. 2-*C*.—Illustrating variations of the *mesio-distal* angle; also spoken of as the "*horizontal angle*" because all of the variations of the angles are presumed to be on the same plane, i.e., a horizontal plane.

angle of the rays is ordinarily straight through the teeth from facial to lingual, or, to express the same idea differently (and quote Simpson), "parallel to the plane of the proximal surfaces of the teeth."

Different teeth require different *vertico-horizontal* angles. To save time

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and effort and avoid unnecessary uncertainty, some sort of angle-measuring device is necessary to determine the vertico-horizontal angle. Figs. 3A, 3B, and 3C illustrate a rough working model of an *angle meter* of my own design. This *angle meter* can be attached to any cone or cylinder. It is seen in the

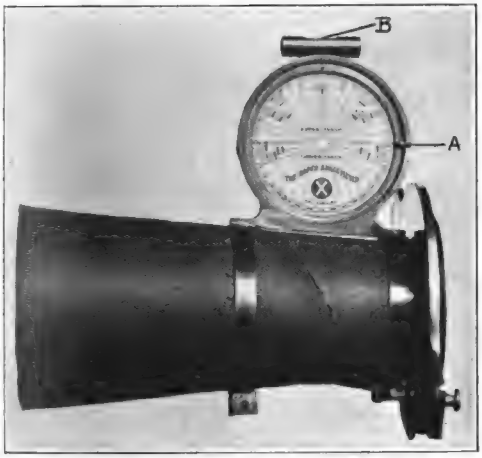

Fig. 3-*A*.

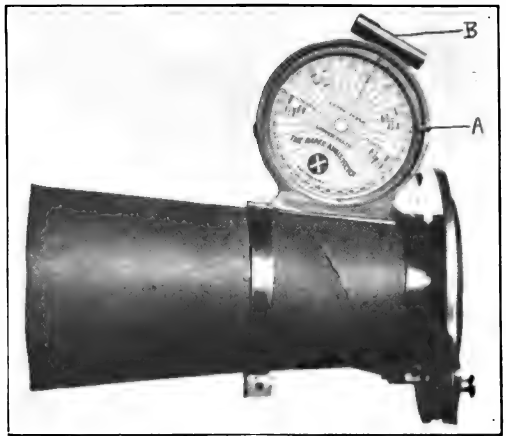

Fig. 3-*B*.

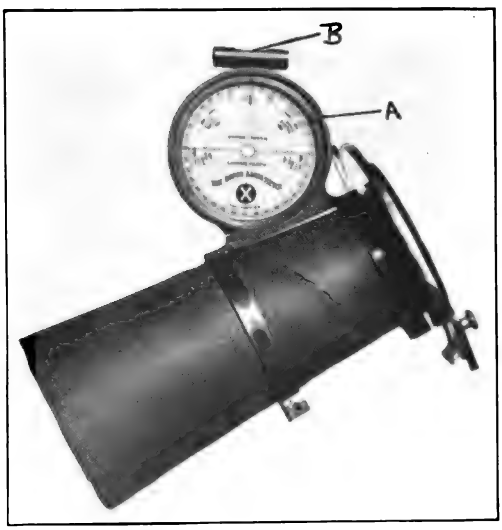

Fig. 3-*C*.

Figs. 3-*A*, 3-*B*, and 3-*C*.—A crude working model of the Raper *angle meter*. In Fig. 3-*A* the indicator "A" points to zero and the angle of the x-rays is horizontal. In Fig. 3-*B* the dial has been moved to an angle of 30 degrees above the horizontal (an average angle for maxillary molars) that is to say, the meter is "set" for an angle of "30 degrees above." In Fig. 3-*C* the cone has been tipped until the spirit level, B, registers center; that is, until the cone (and so the x-rays which would pass through it) is tipped at an angle of 30 degrees above the horizontal.

When the cone has been tipped to give the angle for which the angle meter has been set, the operator must make it a point not to change this angle. The focal ray may be centralized by moving the cone (and so the x-ray tube) up or down or sidewise, but the vertico-horizontal angle should not be changed. (The focal ray is a more or less imaginary x-ray passing from the center of the focal spot through the center of the cone or cylinder. This ray should also pass through the center of the part being radiographed and strike the center of the film.)

Since the meter illustrated here was made a number of alterations have been made in the markings on the dial.

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illustrations attached to a cone. For the technic of the use of this angle meter see the legends under the illustrations.

POSITION OF THE FILM IN THE MOUTH

If the films are placed in the mouth always in the same way and in as close apposition to the tissues as possible, then the only variation in position of films which occurs is due to variation in anatomic forms. This variation in anatomic forms is provided for by a *range* of angles on the *angle meter.* The extent of the *range* is ordinarily ten degrees. The center of the *range* is the *average correct angle,* which will be found correct in about 90 per cent of cases. To elucidate, suppose the range for maxillary molars is from 25 to 35 degrees above the horizontal, the average correct angle then is 30 degrees

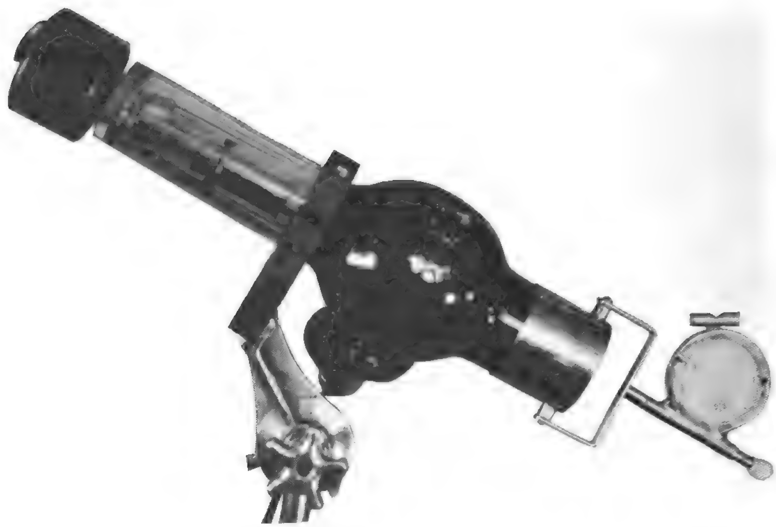

Fig. 4.

Fig. 4.—The *angle meter* mounted on a focal ray indicator or pointer. The pointer and angle meter swings to the side when the angle is correct and the operator is ready to make the exposure.

above the horizontal. In the case of the maxillary molars there is a *permissible extension of the range* down as low as 20 degrees, in selected cases.

I do not use the film holders which hold the film flat, i.e., which prevent bending the film. When the film is held flat, it cannot be brought into uniform contact with the tissues. Thus two of the fundamental laws of radiography are violated: the one which states that the film should be as close to the object being radiographed as possible, and the other which states that the best relative positions for film, "part," and x-ray tube are to have the film and part parallel and the x-rays striking both at right angles, and *not to depart farther from this ideal arrangement than necessary.* (The use of the flat film holder necessitates a more diagonal x-ray angle. There is therefore more chance of distortion and shadow misrepresentation.)

DIFFERENT WAYS OF HOLDING FILMS

The following is the history of the different methods I have used to hold films in the mouth. First I held them myself, but stopped this almost as soon

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as I started it. The practice is dangerous, unnecessary, and wrong. Next I had the patient hold the films for both maxillary and mandibular teeth. Then I commenced to use film holders for the mandibular teeth and the patient's thumb for the maxillary teeth. I considered it an advance in technic when I discontinued having the patient use the fingers to hold upper films and had them use the thumb only. It was also a bit of hard-earned knowledge to learn to direct the holding force of the patient's thumb "straight up"; this kept films from slipping downward. The following holders were used for the mandibular teeth: (1) A modified Kny-Scheerer holder, (2) the Heidbrink holder,

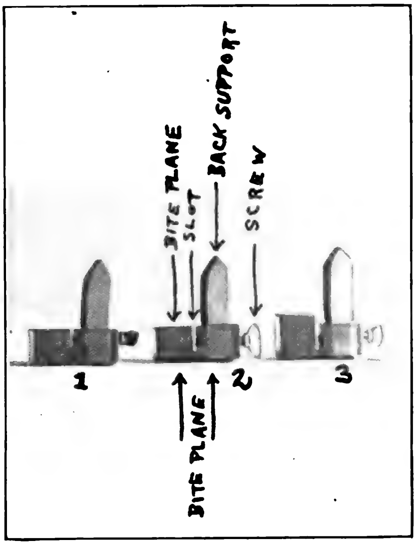

Fig. 5.

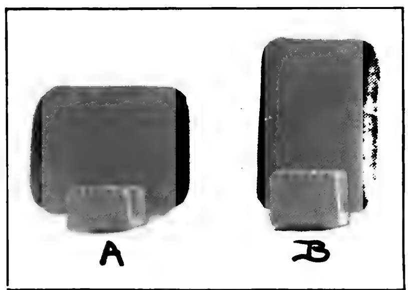

Fig 6.

Fig. 5.—A set of three universal film holders. All the films for Figs. 13 and 14 were held in the mouth with these holders.

No. 1. If the use of these holders causes undue discomfort, it may be due to the fact that the rubber back support is too long; cut it off. The average correct length of the rubber back is ¾ to ⅞ inch. Holder No. 1 may be used for the maxillary teeth, with the film crosswise for the posterior teeth and lengthwise for the anterior teeth. Also it may be used for all the mandibular teeth—if the floor of the mouth is low enough—with the film packet placed crosswise. (See Fig. 6 for explanation of meaning of "crosswise" and "lengthwise" as used here.)

Holder No. 2 is identical with No. 1 except the slot is deeper. Therefore, it does not force the film packet as far rootwise. It may be used the same as holder No. 1. Because it does not force the film pack so far rootwise it is an easier holder to use.

Holder No. 3 may be used with the film lengthwise for the mandibular anterior teeth, as well as in regions where teeth are missing. It may also be used in cases of horizontally impacted mandibular third molars where holders No. 1 and No. 2 force the films down so low that we do not get a radiographic view of the tissues above the impacted teeth.

(3) the Schaffer-Pierce holder, and (4) for the mandibular front teeth, for a while, the Leach holder.

UNIVERSAL FILM HOLDER

Recently I have used a set of three holders (Fig. 5) for all parts of the mouth. All of the films for Figs. 13 and 14 were held with these holders. They may be made of metal or some radiolucent material. The advantage of the radiolucent material is that it does not leave a deep radiopaque mark on the finished negative.

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The "back support" (Fig. 5) is of flexible rubber (or it may be a spring). It is this feature that makes the holders practical for the maxillary teeth. The rubber will "give" as may be necessary to get the film and holder in place; the rubber will also hold the film in apposition to the tissues.

Note that the distance between the bottom of the "slot" (Fig. 5) and the top "bite plane" is different in each holder; it is greatest in No. 3 and least in No. 1. The shorter this distance (slot depth) the farther the film packet will be pressed rootwise. Thus, for example, if the floor of the mouth is deep, the operator would choose holder No. 1 (for the posterior teeth), while if the floor of the mouth was not so deep, he would select holder No. 2.

Films may be placed *crosswise* (Fig. 6A) or *lengthwise* (Fig. 6B) in the holder and so placed either *crosswise* or *lengthwise* in the mouth. (By "cross-

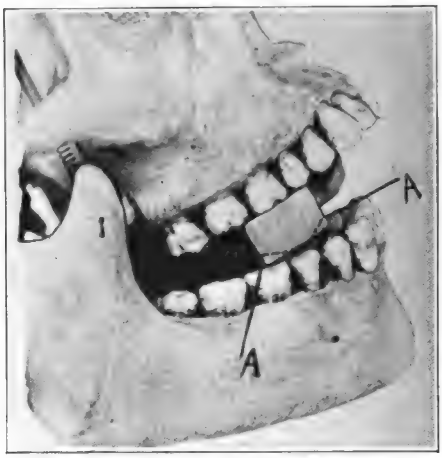

Fig. 7.

Fig. 7.—The lower teeth touch the holder only at the extreme posterior edge. The force of biting would cause the holder to tip downward in front. This is prevented by beveling as indicated by the dotted lines *A*. Both ends of the bite plane are beveled so the holder may be used on either right or left side, maxillary and mandibular, without tipping.

wise" is meant that the long way of the film is at right angle to the long axis of the teeth. By "lengthwise" is meant that the long way of the film is parallel with the long (axis) way of the teeth.)

Another feature of these holders is the "beveled bite plane." Fig. 7 shows a holder without the bite plane being beveled. Read the legend under Fig. 7.

The screws in the holders (Fig. 5) hold the film packet immovable in the slot.

ADVANTAGES OF FILM HOLDERS OVER THUMB OR FINGERS

The following are some of the advantages of the Universal Film Holders over having the patient hold films with the thumb or fingers (Figs. 8 and 9):

1. Slipping (movement) of the films is less likely to occur.

2. Gagging is less likely to occur. (This, because the films are not pressed *so hard* against the tissues, and because "slipping" does not occur.)

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3. It is less difficult and requires less time to place and hold a film packet with the film holders.

4. There is not the danger of placing the film *too far* rootwise or *not far enough* rootwise when holders are used.

5. There is less danger of getting the shadows of the teeth on the film at an oblique angle when the holders are used. See Figs. 40A and B.* (The objection to having the teeth on the negative in an oblique manner other than that parts of the teeth may be missed, is that such negatives do not have a good general appearance.)

6. In some cases of rheumatism, where the patient cannot raise the hand, and in cases of palsy when the patient cannot hold films with the thumb or fingers at all, but can hold the films readily enough with the teeth by means of film holders.

(*To be continued.*)

*To appear in a later issue.

INDICATIONS FOR RADIODONTIC EXAMINATIONS*

By L. R. Main, D.D.S., St. Louis, Mo.

WHILE the use and advantages of the x-ray in practically every department of dentistry are well known to most of us, still it is well and perhaps advisable to spend some time in a review of the indications of its use, before the different phases of the subject are presented by the other men on the program in this department.

The advent of radiodontia is perhaps one of the most welcome of the recent developments of dental science by the more careful and scrupulous men in our profession, and is perhaps the most condemned and ridiculed of all the newer things which have taken their place in modern dentistry by men who are inclined to laxity in their work and who are afraid of the truth, as frequently revealed through an x-ray examination, when this examination is done conscientiously and with precision. Because it is so frequently improperly done, because sometimes our information is limited and sometimes the patient will resent resorting to the use of the x-ray as an aid in diagnosis because of fear, or expense, is no reason for our not agreeing with the most advanced thinking of the profession on these grounds, and ascertaining all information possible in every case.

Whether we all agree as to the use of the x-ray in our work, whether we hold the opinion that because of the few mistakes that are made, we will have nothing to do with the radiogram, the use of the roentgen ray as an aid in dental practice has come to stay, at least, until something new is discovered or invented which will give us more light on dental disturbances than has been possible to secure with the radiogram. Regardless of how prejudiced we may

*Read before the Tri-State Dental Meeting, Kansas City, Mo., April 10-15, 1922.

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have been, or still are, I am sure we will all concede this as true, and yet the application of x-ray findings in the average office is barely in its infancy.

Since the x-ray can be used, and is used, in every department of dental practice, save, perhaps, some phases of prosthodontia, and as Dr. Raper states in his recent book "there are over sixty distinct and definite conditions revealed by the radiograph which cannot always be determined by any other means," surely it behooves us to consider just a few of its many phases.

The only possible excuse for ever resorting to an x-ray is to get information and this information is to aid us in making a diagnosis. The value of the roentgen ray as an aid in making a diagnosis in everyday practice is invaluable, not only to locate the usual foci of infection, which is common to us all, but also in determining any abnormal condition about the oral cavity which might be an etiological factor in other manifestations. We are usually so engrossed while looking at a film in finding dark spots at the root ends that when the so-called areas of rarefaction are not found, or upon the use of the vitality test all the teeth are vital, we are apt to give a negative report, forgetting the other valuable information, which is frequently found by the use of the radiogram.

If dentistry is to continue to grow in its possibilities; if we are to serve humanity to the full extent of our opportunities; if we are to solve the problem of oral sepsis and perhaps eliminate many constitutional disturbances; and if we are to conserve health, also time and needless expense to our patients and to ourselves, we will have to proceed on the fundamental principles of oral diagnosis. I realize from my own experience the weakest link in the whole chain of dentistry is in the lack of our appreciation of the value of diagnosis. You may say, "I always make a diagnosis before I commence dental work of any nature." If so, I am glad, indeed, for you, but I repeat, from my own experience, the weakest link in the whole chain of dentistry is in our diagnosis.

To my mind there never was a time which required so much common sense to practice as the present. Which method are we to follow is ever the question when we consider diseased teeth. From the articles we find in dental literature we are almost as much at sea as we were three years ago. Still, through it all, we have more light by which to work than in any previous time and I am sure dental diseases are better understood. Before any treatment which involves the vascular tissue is started, it is always advisable to know the condition of the underlying structures as well as that which we observe in our clinical examinations. Here is where the use of the x-ray plays the important part. While the radiogram is only one of the means in aiding us in our work, it is the most potent factor we have in making a diagnosis. While the use of the radiogram may be abused and sometimes is, and while many condemning statements can be justly made from the patient's viewpoint, still in spite of these the intelligent use of the x-ray in dental practice has done more to revolutionize dentistry and stimulate better dentistry than any other one factor. Yet many men fail to avail themselves of this important asset in determining dental conditions. It is as necessary to

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resort to an x-ray in making an intelligent diagnosis as it is to have a casting machine to make a perfect fitting gold inlay. If our dental operations are to be successful, our diagnosis must be fully and carefully made.

If our information has increased, then our responsibility has also increased. We are expected to step up into the light we now have. As dentistry is becoming more and more exacting, the problems with which we now come in contact are more serious. There has been a responsibility shifted to the shoulders of the profession which we must assume, and that responsibility is the conservation of health. The first requisite in accepting this responsibility is knowledge. Knowledge of physiology and anatomy, especially pertaining to the oral cavity; knowledge of the fundamental principles of pathology and surgery; knowledge of the general disturbances which could be of dental origin, either as a result of infection or reflexes, from abnormal pressure on nerves. How are we to determine these possibilities without the use of the radiogram? So far as the future is concerned, by the aid of the radiogram we can prevent much of the trouble, which we now find has developed as a result of insufficient light by which to work a few years ago.

If an ounce of prevention is worth a pound of cure anywhere it is surely true in dentistry. The wealth of a nation depends very largely upon the health of the individuals who compose that nation. A person's success in the world depends on his ability to keep well. Preventive medicine, in some degree, depends upon our ability to take care of dental disturbances. How can we take care of these disturbances intelligently unless we know the condition of the whole tooth and adjacent tissues? Are not our patients entitled to the full truth, so far as it can be secured, should any of the usual means at our command be withheld when a diagnosis is desired?

If the x-ray is as valuable in dental practice, as men who are in the habit of using it would have us believe, are we ever justified at guessing in any of our work when the light of the x-ray would eliminate about 75 per cent of this guess work; for example, the length of a root of a central incisor, the canal of which we expect to fill just to the apex?

I believe before we, as a profession, can approach the possibilities of our endeavors, we must have a new vision of our responsibility. In practically every case (of adults especially) coming to us for treatment, unless it is emergency work, we must spend at least as much time on our diagnosis as we ordinarily do on restoring a tooth with amalgam. We must quit treating a tooth two or three times and say if it does not respond, we will then make a radiogram, which is another way of saying, we will diagnose your case. Generally speaking, the first thing a progressive physician does when called on a case is diagnose, then prognose, and prescribe. I would go further and say we must diagnose the whole mouth, all the teeth, which includes the use of the x-ray in practically every case. The condition of the whole usually materially influences the prognosis and treatment of the few which may be diseased. We too frequently spend hours of time on beautiful carvings of inlays and other restorative work (which in itself is all right) when no direct

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attention was first given to secure information as to the condition of the root ends of the tooth before our restoration is started. How often have we all heard it said, "I recently crowned this tooth which is now giving trouble, but I did not do the root canal work." If the x-ray had been used first, in many of these cases much of our embarrassment in this type of trouble could have been prevented. I maintain, any devital tooth on which you expect to place a crown or a filling, or to use as an anchor in supplying missing teeth, regardless of who devitalized the tooth, and even if it were done years ago and has had a perfect history, should be radiographed before the patient is asked to spend time and money on it. We fail in our efforts frequently, even today, and sometimes on patients who are suffering from metastatic infections because this is not done.

There has been a great deal in dental literature about physicians making recommendations regarding the teeth of their patients, which does not always coincide with the ideas of the dentist. In many instances teeth are extracted on medical advice with which we, as dentists, do not agree, and no doubt in altogether too many cases perfectly good and useful teeth have been sacrificed but what have we to offer in defense of our claims. We say the dentist should be consulted in all matters pertaining to the teeth, and their extraction should not be done without his advice. I most surely agree with this, in every case, *if* he has put forth the effort and the necessary time to make a complete dental diagnosis. But if the dentist has not used every available means in ascertaining the true dental condition, in many instances he has not sufficiently enlightened himself upon the conditions in the case to be reasonably sure of the possibility of some of the teeth not being detrimental to the health of the patient. The average physician is no more versed on dental pathology than most of us are on general pathology. If we commence to talk dental nomenclature we are not fully understood by our medical friends. To my mind the most tangible thing to present, that which is fairly well understood by both men, is a complete and thorough radiodontic examination. If one man is too anxious to extract this will check his overanxiety to remove all infections by removing all the teeth, and in doing so, needlessly remove good teeth in order to be sure to get the bad ones. To the other man who may be more conservative, it will also give additional information as to the true conditions and the advisability of extracting any teeth, and he will be in a much better position to attempt a prognosis, both local and systemic.

In this day when so much agitation for radiodontia is prevalent among the laity as well as medical men, it would be a safe practice to make a thorough and complete examination for all our patients as the occasion presents itself, and keep this record for future reference. Dental work now being done on questionable teeth without the use of the x-ray must be condemned.

The indications for radiodontic examinations are numerous, too numerous to indicate here every degree to which the x-ray can be used to advantage in the practice of general dentistry and in all the special lines of dentistry. Some of the indications must receive special consideration and

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I must be extremely practical in these recommendations. I wish to say now that any man who is depending entirely on radiodontic findings for a diagnosis is almost as negligent of his duty to his patient as the man who entirely discards the information gained by the use of the x-ray. I am taking it for granted that a complete clinical survey of the oral cavity is made, that at least a partial history is secured from the patient as to general health, etc., and that the history of suspicious teeth is recorded. Now the conditions indicate the necessity for information as to what may be found in and around the roots, and adjacent structures. First, the importance of complete radiodontic examinations cannot be emphasized too strongly, for in most cases the only way I know to tell whether a complete x-ray is necessary is to make the examination first and then you are in a position to decide if it were necessary.

Too frequently we are of the opinion, if the teeth respond to the vitality test, that the x-ray is counterindicated. If there are no apical abscesses, we must not think there is nothing else to be revealed by the x-ray and the examination is superfluous. On the contrary, many conditions may be found which can and do influence the general health and may be responsible for local disturbances as well.

Perhaps the most frequent use of the radiogram is to determine the periapical condition of devital teeth. There are some who claim they are able to satisfactorily determine this by palpation and clinical findings, but I am frank to admit my inability in these lines. For myself, I know it is absolutely necessary to use the radiogram. If conservative treatment is deemed advisable on any tooth where the destruction of tissue is evident, we must determine as far as possible the number of canals, their shape, length, and possibility of access to each canal. According to the best information on root canal work, diagnostic wires should be placed in the canal and another radiogram made, then the canals should be filled and a check-up made to determine the results of filling. In order to further determine the success of our efforts, at least another check-up is advisable in from three to nine months, depending on the conditions, to note the regeneration of bone. While to many this sounds too extreme for practical purposes and while I realize this is not always done and occasionally cannot be done, still I am of the opinion that if we are to serve humanity to the fullest extent, if we are to eliminate dental foci of infection, we will have to know the whole truth in all these disturbing conditions which at the present time is best revealed through the x-ray. Surely the responsibilities of the profession are increasing. Many mistakes in diagnosis, treatment and surgical procedure could be avoided by the intelligent use of the roentgen ray.

Perhaps one of the most important uses of the x-ray is in the treatment of vital teeth. We have learned that the chief source of dental infection is from teeth on which a dentist was called to operate on the pulp of a tooth, and largely due to the lack of knowledge the work was incomplete, and apical disturbances followed. We have also learned through the radiogram that when the root fillings are done thoroughly and asceptically, apical disturbances are

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less likely to follow. So in our present root canal work, one of the chief advantages is that with the aid of the radiogram, most of our guesswork is eliminated as we can measure the length of the roots, ascertain their shapes, and check up the results of our efforts and see whether the work was properly done.

The exodontist must continually work with the x-ray, not only to locate unerupted and impacted teeth, but especially to determine that no root ends remain in sockets (Fig. 1) and that necrotic areas are properly cared for after extractions. In sockets from which teeth were removed but which failed to heal readily, we sometimes find that pieces of teeth, filling material, and broken instruments are responsible for the delayed healing. Or it may

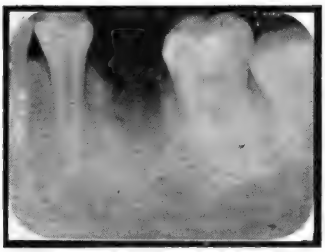

Fig. 1.

Fig. 1.—Root remaining in the socket of mandibular first molar. Proved to be a third root.

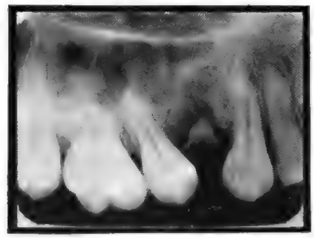

Fig. 2.

Fig. 2.—Root end remaining, curettement necessary.

Fig. 3.

Fig. 3.—Cavity on distal of second molar responsible for indefinite pain through left maxillary arch.

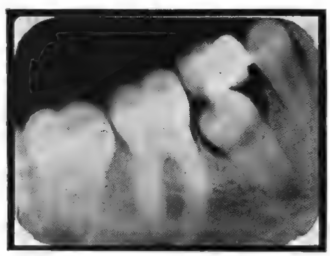

Fig. 4.

Fig. 4.—Mandibular second premolar retained too long, responsible for reflexes through inferior dental to pneumogastric.

be a cyst was responsible for the loss of the tooth, and in most cases it is necessary to know the size of the area in order to remove the cystic wall. It seems to me in every case of gross destruction of bone around diseased teeth, the extent of the destruction should be determined, for if a curettement is advisable, usually the radiogram is our chief guide in determining the extent of the curettage (Fig. 2).

In cases of indefinite pain, especially along the course of the trifacial nerve, it is many times impossible to locate the cause of this trouble by other methods. I have seen many cases where teeth have been opened into, some even devitalized, and still the pain continued until the radiogram revealed an inaccessible cavity at or under the gum margin, an unerupted tooth,

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usually a third molar, a supernumerary or hypercementosis, and in a few instances pulp stones were found to be the factor. How much time and pain could have been saved, had the radiogram been used in the beginning. (Figs. 3 and 4.)

In all cases of so-called pyorrhea, an x-ray is advisable and in well established cases, it is absolutely imperative to determine the extent of the destruction of the supporting tissues (Fig. 6).

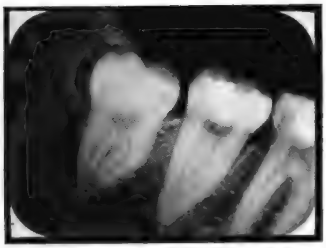

Fig. 5.—Third molar causing pressure on inferior dental nerve, causing headache. Relieved on extraction.

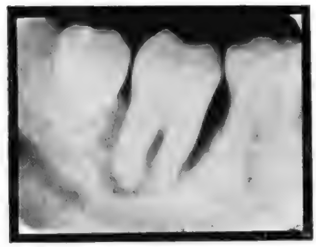

Fig. 6.—Pyorrhea case. Clinically in fair condition. Radiographic findings very unfavorable.

Fig. 7.—Orthodontia. Supernumeraries.

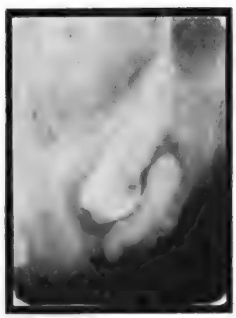

Fig. 8.—Edentulous arch. Denture used for several years.

Fig. 9.—Unsuspected cyst. Impacted lateral which is most uncommon.

The radiogram has become indispensable in the practice of orthodontia. So many teeth which are not found clinically are revealed by the x-ray, their position located, their development noted, and usually the aid in a prognosis is of material advantage. The use of the radiogram sometimes materially changes the ordinary course of treatment in orthodontia, when it proves the tooth missing from the arch is also missing altogether from the mouth. Another advantage is, the information which can be secured as to the amount of space necessary to allow an erupting tooth to take its place in the arch. The presence of supernumerary teeth which are sometimes quite distressing, can easily be ascertained (Fig. 7).

A check-up on all large approximal fillings is advisable so that the cervical margin can be studied. The overhanging margins of amalgam, especially, frequently give rise to considerable loss of alveolar process as well as

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the gum septum. A radiogram is likewise advisable in determining the position of the pulp where large restorations are to be made on vital teeth, and to observe the relation of the apices of upper posterior teeth to the antrum, as well as to aid in diagnosing disturbances in the antrum.

Some of the other conditions revealed by the radiogram, which occasionally come under observation, but which are not so common in everyday practice as the indications which we have just reviewed, are edentulous spaces with no history of extraction of permanent teeth. The condition of these spaces should be determined before any restorative work is started. Sometimes bridges have been placed on teeth to restore the missing organs and afterwards unerupted teeth have given trouble (Fig. 8). There are also some cases where entirely edentulous arches should be x-rayed. When every symptom in a general disturbance points to the presence of some focus of infection and every other examination is negative, it is sometimes found that root ends remain in the sockets of extracted teeth. There are also found in some instances supernumeraries, fully developed canines and third molars which were no doubt impacted in earlier years; and after dentures have been used for several years, these teeth have become disturbing factors and the radiogram reveals pathologic disturbances about these remaining teeth and root ends.

Other conditions are sometimes revealed which perhaps come more under oral surgery than general dentistry, such as fractures, cysts, temporomandibular disturbances, odontomas, etc., but these are not of such vital importance at this time as we are now considering the phases which we meet in everyday practice (Fig. 9).

While I have not attempted to cover everything revealed by the radiogram which is observed in dental practice, I believe the conditions mentioned will prove that the indications for the use of the x-ray in dentistry are so numerous that to even attempt to practice without access to this valuable aid for most of our work, is to be placed in an unfortunate position and one which will sooner or later lead to embarrassment and perhaps failure.

I do not wish to appear too severe or critical in any destructive sense, but I am anxious for all of us as dentists to be alert to our opportunities and responsibilities, to be constructive and not destructive in our dental operations and to practice rational and not empirical therapeutics.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Officer, Give Him One More Chance

Q.—What is the best technic for treating pyorrhea with the x-ray, and how soon can results be expected? I have a —— unit which is said to be safe, so have been trying it on a few pyorrhea cases. It is easy for the front teeth by just having the patient hold the lips out, but it is hard to get the molars this way.

A.—Now, the suspense is ended, there is nothing worse to fear. Inadequate examinations and incorrect diagnoses fade into insignificance, when dentists meddle with radiotherapy. Since having the price is the only quali-

Fig. 1.—Calcareous deposit with extensive alveolar absorption on the lingual.

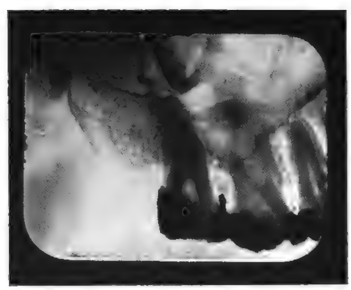

Fig. 2.—Projecting restoration contributing to periclasia.

fication at present required for a dentist to operate an x-ray machine (or introduce it to a cheap assistant), it is time for Dental Examiners to include the rudiments of radiology in their examinations for a license. How could they examine in radiology when * * * * * ? The same way they examine applicants in chemistry. Have some one prepare the questions or crib from a textbook, look wise, and balance on their authority. Your dear (mercenary) alma mater did not teach radiology or radiodontia? Certainly not, dental colleges follow the profession instead of leading it, but where did you learn radiology? Then what right have you to practice it? This thought is restricted from use by any liability insurance blackmailing white washers. Is

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it not queer how liability insurance is solicited by intimidation and fear of losing your "flivver" and scrap gold because you miscalculated in using 3 in 1 instead of 1-2-3 (figuratively speaking), but after paying tribute and being taken under the protective wings of a corporation you may practice septic dentistry and have your office girl give electrocution rehearsals with the assurance you will be exonerated of anything done in a dental chair.

The x-ray is a great diagnostic aid in the prevention and treatment of pyorrhea alveolaris, but its therapeutic value in this disease has not been established. Since everything from vapor to steel has been recommended for periodontoclasia, it would have been surprising if an agent so potent and mysterious as the x-ray had been ignored. It has not, and periodically an empirical account of unconvincing "cures" by x-radiation is published. Most of these articles originate in Europe, where experimental melodrama flourishes at the expense of clinical efficiency, and if a defective memory serves aright the sepulchral Dental Cosmos usually acts as American sponsor.

The reaction of tissues and organs to x-radiation is so astonishing that

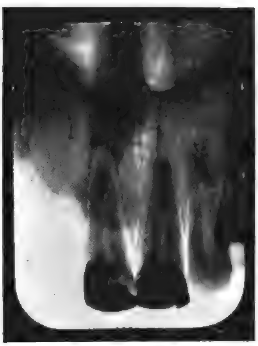

Fig. 3.

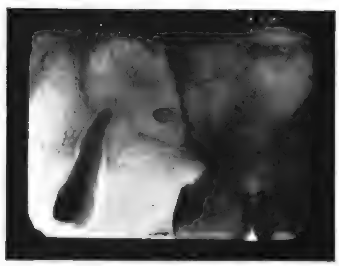

Fig. 4.

Figs. 3 and 4.—Typical thickening of periodontal membrane from traumatic occlusion. In these cases by denture attachments.

the possibility of periodontoclasia responding to this treatment is granted, but the complex etiology of the disturbance makes it unlikely. As a direct answer to your question, dismiss the idea, for the probable benefits do not justify the risk. Radiotherapy should be practiced only by those who have made a thorough study of the science. The present knowledge has been acquired by long clinical experience and at the cost of permanent injuries and lives. It is now passing through a period of radical changes with future developments problematical.

Your toy equipment is inadequate for any treatment excepting the removal of superfluous hair, and as a depilatory agent it probably would be a success. The only way you will cure pyorrhea with it is by removing the seat of the disease when the face "sloughs off." There is a useful field in periodontoclasia for the x-ray when it is applied to radiography. Incipient alveolar absorption may often be observed in radiograms before it is distinguishable by changes in the gingiva. Calcareous deposits, projecting

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restorations, imperfect contact surfaces, loss of contact, and traumatic occlusion, all predisposing factors in periclasia are disclosed by radiodontic examinations. Successful treatment of periodontal lesions directly depends upon the early discovery and removal of the causes, and this service alone warrants periodic general radiodontic examinations.

In advanced stages of marginal destruction, the radiogram is a vastly more accurate means of determining conditions than instrumentation, contrary to the statements of some periodontists. Doubtfully assuming that the irregular line of destruction could be correctly charted by the digital diagnostician, the length of the roots and the amount of unimpaired attachment are unknown, and the mobility of teeth is not dependable evidence. One

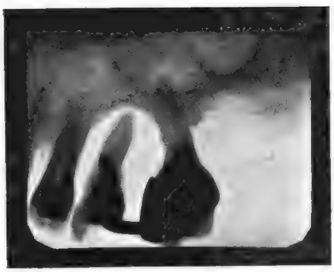

Fig. 5.

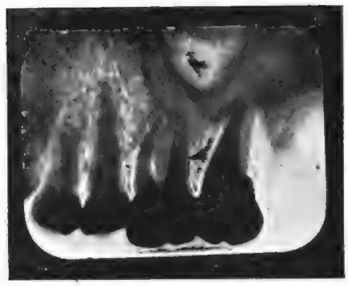

Fig. 6.

Figs. 5 and 6.—Teeth retained by splints after complete loss of bone support.

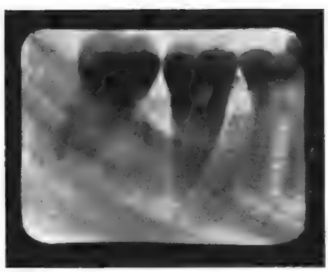

Fig. 7.—An illustration of how the line of bone destruction can be distinguished on different surfaces.

"pyorrhea specialist" who has said that radiograms were not necessary in his treatment, treats all teeth which do not fall out, and permanently dismisses patients as cured after a course of treatment and collection of the fee. The natural conclusion is that he wishes to protect his conscience by not knowing the extent of alveolar involvement and the deception which he is practicing.

Ignorant defamers of radiography say pyorrhea "pockets" cannot be seen in radiograms except on the mesial and distal surfaces. In the character of radiography which these men probably use, it is surprising that marginal absorption shows in any location. The man who depreciates radiodontic examinations knows little about the practice, or he would be so impressed with the advantages that the limitations would be forgotten. Figs. 1 and 7

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illustrate how the line of bone destruction on each surface can be distinguished. Teeth with hopelessly impaired attachment should be removed, not treated to please the vanity of the patient or splinted to obtain a dishonest fee. Except in cases of trauma, teeth requiring splints offer no prospect of being made serviceable and should be eradicated. The x-ray examination is the deciding factor in this diagnosis. Cooperation of the patient is essential to the efficient treatment of periodontoclasia, and a general radiodontic examination is of great assistance in securing it. The psychic effect upon a patient by displaying a set of negatives depicting the bone destruction is more impressive than any description or plea the operator can present. The radiographic record of the actual disintegration of one's self will jolt the most frivolous society butterfly or avaricious financier into full cooperation with the dentist to arrest the progress of disease. This field offers ample opportunity to serve your patients in the legitimate practice of dentistry without usurping radiotherapy.

Focal Inspection

Q.—If a fine focused tube is best for dental radiography, how can I focus it and tell when it is just right?

A.—An x-ray tube is "focused" during the process of manufacture and cannot be changed without returning to the factory for readjustment of the parts and repumping. The term "focus" in relation to tubes is misleading, as x-rays cannot be focused, although experimentally they may be refracted. A fine focus tube is one in which the cathode stream is concentrated upon a small area of the target, and the source of radiation is limited to that area. With other factors constant, a small focal spot produces an image which is sharper in detail and more nearly the true size of the object than would a large focal spot. There is no standard gauge for focal spots but those less than 5 mm. in diameter would generally be considered fine; those from 5 mm. to 8 mm., medium; and those over 8 mm., broad.

After a tube has been used for a time the target will show a marking from the impact of the cathode stream which is the approximate size of the focal spot. An accurate method of determining the size of the focal spot is to interpose a sheet of lead with a pinhole equidistant from the target and film, and radiograph the source of the rays. The lead need not be more than $\frac{1}{16}$ of an inch thick, the pinhole should be the size of a No. 10 needle, and the sides of the opening slightly reamed to remove irregular margins. If the lead is placed about 12 inches from the target and film and an exposure of 10 seconds made, any wavering of the focal spot will be registered. A striking illustration of the effect of different focal spots may be shown by radiographing a wire or a wire screen suspended half way between the target and film.

The demand for perfect intraoral radiography indicates the finest focal spot practicable, which is about 2 mm. for 10 ma.; 3 mm. for 20 ma.; and 4 mm. for 30 ma. The target will be fused by a focal spot smaller than the above proportions, unless short interrupted exposures are used to permit the

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dissipation of heat. In ordering tubes the size of the focal spot and the milliamperage used should be specified and proved by test before acceptance. Tube manufacturers are disinclined to supply fine focus tubes because the

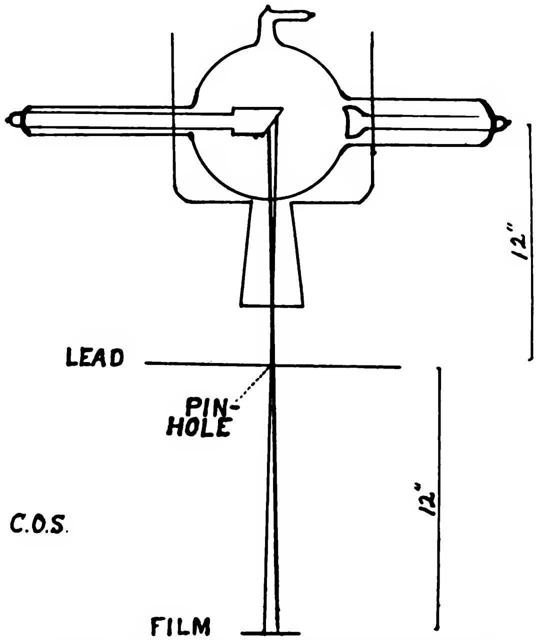

Fig. 8.—A method of radiographing the focal spot.

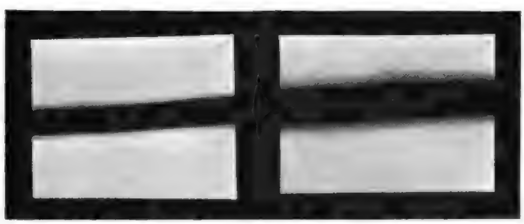

Fig. 9.—Wire test of a fine and a medium focal spot.

difficulty in adjusting a fine focus limits the production, and improper use of such tubes is likely to cause complaint. Know the type of tube suitable for your work, insist upon getting it, and do not abuse it.

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EDITORIALS

A Plea for the Proper Use of the Soldered Lingual Wire in the Treatment of Distoclusion

THE treatment of distoclusion cases has always been more or less of a problem to a number of men practicing orthodontics. This is proved by the fact that the last meeting of the American Society of Orthodontists devoted a large amount of time to distoclusion cases in spite of the fact that this type of malocclusion has been known for many years and has been successfully treated by many. If you would take the opinion of a number of men who have spent years in the practice of orthodontics you would find exactly two extremes in regard to this type of deformity. There would be some who claim that such types of malocclusion are easily and satisfactorily treated

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while there would probably be equally as many who consider them the most difficult and extremely unpromising.

Just why this great difference of opinion should exist is unknown to us, but probably it is the result of different technical procedures in the treatment of these deformities. It has been our privilege to see a great many cases from the practice of various men and we have often been impressed by the fact that the treatment, as it was progressing, would indicate that the operator was not exactly familiar with the mechanical technic he was employing. We know of no type of malocclusion in which the plan of treatment has been more satisfactorily worked out than in distoclusion cases. This is equally true with that type characterized by labioversion of the premaxillary incisors and also those cases in which the premaxillary incisors occupy positions of linguoversion.

These cases have also been satisfactorily treated with both fixed and removable appliances and results have been accomplished by using a combination of the labial and lingual appliance as suggested by Dr. Lourie several years ago. In fact, since Dr. Lourie brought forward the use of the soldered lingual wire in conjunction with the high labial appliance a great many men have been using that form of technic. To our mind, that style of appliance as described by Dr. Lourie, and as published in the fourth edition of "Practical Orthodontia," is one of the most satisfactory, if properly employed. However, the extreme simplicity of the soldered lingual alignment wire when applied to the mandibular teeth in distoclusion cases has resulted in its improper use.

In our practice, the soldered lingual alignment wire on the mandibular teeth is extremely valuable. In order to accomplish the desired result it must be used with the proper knowledge of wire stretching and the case must be under constant observation. We have found several men have become careless in the use of the soldered lingual alignment wire in distoclusion cases when applied to the mandibular teeth and are not pinching the lingual wire sufficiently to get the proper expansion. In conjunction with the above appliance on the mandibular arch, some use a labial appliance on the maxillary teeth and get much more rapid expansion of the maxillary arch than they do of the mandibular arch. They then apply intermaxillary rubbers and bring the mandibular arch forward before having the proper amount of expansion.

Such a procedure results in the case's being about one-half completed, and there it remains to a certain extent stationary so far as further improvement is concerned.

The whole fault lies in the improper use of the soldered lingual alignment wire, which when once adjusted, is a very neat and comfortable appliance and the operator feels secure because of the inconvenience to the patient. The appliance creates very little discomfort and the operator fails to stretch the wire enough to get the sufficient expansion of the mandibular arch. If such a technic is followed the soldered lingual wire becomes an objectionable appliance and the result would be much better if a labial appliance had been placed on the mandibular teeth as well as on the maxillary teeth.

Our belief, therefore, is if you are going to use a soldered lingual align-

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ment wire on the mandibular arch, remember that it must be pinched to get the proper expansion and cannot be placed on the teeth and allowed to remain without proper alignment, as we have seen in several instances.

The soldered lingual alignment wire is one of the most valuable in the treatment of distoclusion cases because it lends itself nicely towards changing the plane of occlusion and also to the use of intermaxillary rubbers and is very little of an inconvenience to the patient. However, all these valuable points may be rendered null and void by the fact that it can be misused by the individual who does not pay the proper attention to the wire stretching as to get proper expansion.

Teaching Orthodontia in Dental Schools

WITHIN the last few years the subject of orthodontia and the method of teaching it has received considerable discussion from men who have been paying particular attention to the subject.

Owing to the fact that orthodontia is a distinct specialty of dentistry and so recognized by practically the entire profession, the question naturally arises as to how much orthodontia should be taught dental students, and the best method of teaching it. For a number of years a great many schools did not have a separate department of orthodontia. In fact some of the schools still teach the subject under some other chair. We believe that orthodontia is important enough to have a special department, and the subject is important enough even from the standpoint of the dental students, to require more attention than has been given to it in the past.

From experience in different dental schools and in postgraduate work, we find that practically all dental colleges do not teach enough dental anatomy, so far as tooth form as related to function and occlusion is concerned. When students begin to study the anatomy of the teeth as related to orthodontia, we find they must devote a great amount of time to reviewing dental anatomy in order to be able to grasp the meaning of tooth forms as related to functions and their bearing on the occlusion. Therefore, we really believe that if the departments of dental anatomy would devote more time to the teaching of dental anatomy, as outlined above, the departments of orthodontia would be able to teach more orthodontia to undergraduate students than they have been able to do in times past. We believe, however, that the teaching of orthodontia should extend over a period of two years. Whether it is given in the sophomore and junior years, or the junior and senior years does not make very much difference, so far as we can see.

The first year of instruction in orthodontia to undergraduate students should consist of a study of the anatomy of the teeth, including tooth forms, as related to functions, the review of the normal occlusion and should include the study of the positions of malocclusion, classification of arch relations, and a study of jaw deformities. It is also presumed that before the student takes

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up the study of orthodontia as outlined in the above paragraphs, that they have had comparative dental anatomy which also has a great bearing upon the study of occlusion.

We believe a study of normal occlusion and malocclusion as outlined will require one year's work in a lecture course of one hour a week. After the above subject has been mastered in one year's instruction, the next year the student is ready to continue his study of the etiology of malocclusion, diagnosis and prognosis, consideration of mechanical principles as related to regulating appliances which will include anchorage, different designs of appliances, and an analysis of them. With the consideration of appliances the time should be devoted more to a study of general mechanical principles, than to the technical instructions and applications of the appliances. From experience, we know it is impossible to teach the detail of appliance construction to undergraduate students by devoting but one lecture hour a week, extending over a period of one year.

Treatment of malocclusion should be considered also in a general way. Different types of malocclusion which may be treated by the use of different types of appliances should be explained. The consideration of treatment is with the idea of giving the student a general knowledge of the subject, rather than to expect him to successfully handle the cases in his practice other than the simpler forms of malocclusion.

In regard to a technical course, we believe that the technical work for the first orthodontic year should include the taking of plaster of paris impressions, putting them together, the proper finishing of the impression, separating and trimming the cast. We have found that the average dentist does not take even a fair plaster of paris impression of a case of malocclusion. The cast that he produces from that impression has a lower average than the impression itself. Therefore, the importance of plaster of paris impressions as a part of orthodontic technic is not so much in relation to its use in the correction of malocclusion in the life of the dental student, as to teach him to work plaster. Modeling compound impressions should also be taken, as the student gets few good modeling compound impressions when teeth are present.

The proper manipulation of plaster is something that the average student does not learn. While it seems that the taking of the plaster impression and the construction of the orthodontic models may seem to be a very small technic, nevertheless, if it is properly taught, it will probably require more time than could be given to the subject in the average dental school. Therefore, if this technic was followed out, it would be necessary to rearrange a good deal of the other work to give the proper time to this subject. We make this statement because of experience with undergraduate students in an effort to teach them plaster impression work, and also because we have found in postgraduate work that it takes about 108 hours to teach impression-taking and cast-making to postgraduate students. If it takes that length of time with postgraduate students, one cannot expect undergraduates to learn it in much less time, therefore, where are we going to get the 100 hours for

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technical work, if it is to be taught properly? We believe it should have consideration because of the importance it will have in relation to prosthetic dentistry, crown and bridge work, or anything which requires a correct impression, and an equally good cast. We are not finding fault with the prosthetic department, but every one will admit that a good impression and a good cast as produced in prosthetic dentistry, or crown and bridge work, is the exception, and not the rule.

In regard to a technical course which includes appliance-making or the construction of appliances, we believe that should be taught in the next year and should consist of the students soldering wire so as to make straight end joints and right-angle joints and other designs which the teacher may suggest. The plain bands should be made over artificial stone models with every other tooth carefully carved to anatomical form. This brings into use the knowledge of tooth forms, and develops skill in the manipulation of the cast.

We do not believe that the drawing of wire, the cutting of threads and the making of nuts should be a part of the technical course because this is something that is not done in the practice of orthodontia today.

The next thing to consider in teaching orthodontia, is the orthodontic clinic which is a subject that also has not been satisfactorily settled in the minds of many men. Some schools actually have their senior students treat two cases of malocclusion during their school year. The object of the clinic in dental schools should be to teach the students what can be accomplished in that branch, and what should be accomplished. Where the senior student treats two cases of malocclusion he generally sees those two cases and no others. One or both of the cases has been passed to him from the preceding class. He knows practically nothing of the cases that have been given to him, in relation to the condition before the treatment was begun, and consequently does not have a complete knowledge of the case. If the senior student begins the treatment of the case of malocclusion, the average case is not finished during the period of time he is in school and is therefore, passed on to the next class. This plan has been very undesirable because comparatively few finished results were obtained during the time the student had the case under treatment. One of the greatest disadvantages to this plan is that the senior class graduates during the summer and the orthodontic patients are without care because the orthodontic department does not have sufficient men working through the summer to give them the proper treatment. Consequently, the cases relapse and when the school opens again several weeks' treatment must be given before the case is again progressing along proper lines.

We believe that correction of a case of malocclusion is too technical an operation to be handled successfully by a senior student who has had no previous experience in the treatment of malocclusion. We can see no more reason that students should attempt to correct cases of malocclusion during their senior year than that medical students should be expected to perform all sorts of surgical operations during their senior year. The orthodontic clinic and all the cases treated in that clinic, in our opinion, should be handled by

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a group of men who have special orthodontic training and are able to treat the case correctly. The class should be divided into sections to observe the treatment in the orthodontic clinics, the same as students of medicine witness surgical operations. Under this plan, the dental student would see a large number of cases in different stages of treatment with different types of appliances and each appliance properly adjusted which would give him a better knowledge of the possibilities of orthodontics than he could possibly obtain by attempting to treat two cases himself. Furthermore, the orthodontic clinical staff should have sufficient trained men to care for these cases, not only during the school year, but also through the summer months.

The successful teaching of orthodontia depends upon an understanding of the tissues supporting the teeth. The proper teaching of orthodontia along the lines outlined will be found to produce a beneficial effect on all subjects and will greatly repay all the time given to it.

The American Illustrated Medical Dictionary*

THE American Illustrated Medical Dictionary edited by Dr. W. A. Newman Dorland has always been one of the most important books in the library.

The eleventh edition, revised and enlarged, is just from the press and contains all of the good features found in other editions with the addition of new terms and words which have come into use recently. It practically covers the field of Surgery, Dentistry, Pharmacy, Chemistry, Veterinary, Science, Nursing, Biology, and kindred branches, and consists of a large number of tables that have always been of value to the student.

The present edition contains 1229 pages with 338 illustrations, 141 of which are done in colors. There is no book which is more important to a modern medical library than the eleventh edition of this dictionary.

*Published by W. B. Saunders Company, Philadelphia and London.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Pacific Coast Society of Orthodontists

A cordial invitation is extended to all interested in orthodontia to attend the next Annual Meeting of the Pacific Coast Society of Orthodontists, which will be held in Los Angeles, California, July 13, 14, 15, 1922. Those who contemplate being in attendance are requested to make known their intention to the Secretary as soon as possible. Charles G. Mann, President, Seattle, Washington. Carl O. Engstrom, Secy.-Treas., Box 1070, Sacramento, Calif.

Southwestern Society of Orthodontists

The Second Annual Session of the Southwestern Society of Orthodontists was held in Oklahoma City, Okla., Saturday, April 22nd, Skirvin Hotel. An excellent program, as previously published, was enjoyed. Officers elected for the new year were, Dr. W. E. Flesher, Oklahoma City, President; Dr. T. G. Duckworth, San Antonio, Texas, Pres. Elect; Dr. P. G. Spencer, Waco, Texas, Secy.-Treas. Board of Censors, Dr. Oscar Busby, Dallas, Texas, Dr. T. G. Duckworth, San Antonio, Texas, Dr. W. T. Chapman, El Paso, Texas.

It was recommended and voted that Kansas and Kansas City, Mo., be included in the territory covered by this Society. Applications for membership from all Orthodontists in this territory will be welcomed.

Meeting of the National Alumni Chapter of The Psi Omega Fraternity

The National Alumni Chapter of the Psi Omega Fraternity will hold its next meeting on Monday, July 17, at the Clark Hotel, Los Angeles, California. The Chapter will be called to order at 10 A.M. There will be an afternoon meeting also and an informal banquet at 8 P.M. at the Los Angeles

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Athletic Club. A large attendance is desired. Every Psi Omega should register immediately on arrival in Los Angeles. Headquarters will be maintained during the National Meeting at both the Ambassador and the Clark Hotels.—*Max Wassman, Jr., Grandmaster National Alumni Chapter.*

European Orthodontia Society

The next meeting of the European Orthodontia Society will take place on July 26th and 27th, at No. 11 Chandos Street, London, in the rooms of the British Medical Society.

Several known orthodontists from America expect to be present and offer papers or clinics: Drs. Hawley, Mershon, Fisher. Several members will also give papers. Among the titles already announced are:

Dr. C. A. Hawley, of Washington, The principles and art of retention.

Dr. C. Johanson, of Helsingfors, Some cases of traumatic lesion of the deciduous denture, and its bearing on the permanent jaw and teeth.

Dr. C. Johanson, Two corrected cases of impacted teeth.

Dr. G. Lind, of Amsterdam, Remineralization of the teeth.

Among the demonstrations and clinics are:

Dr. C. A. Hawley, The manipulation of the Ribbon Arch.

Dr. G. Lind, Remineralization.

Dr. J. T. Quintero, Sweating bands for orthodontic purposes.

Complete programs will be forwarded later. Those interested are cordially invited to attend the meeting; further information may be obtained from the undersigned secretary.—*Dr. James T. Quintero, Secretary.*

Meeting of the Eastern Association of Graduates of the Angle School of Orthodontia

The Thirteenth Annual Meeting of the Eastern Association of Graduates of the Angle School of Orthodontia will be held at the Hotel Vanderbilt, New York City, on May 22 and 23.

The following program will be presented:

Monday, May 22

System Applied to Practice.

Dr. S. Merrill Weeks, Philadelphia, Pa.

Studies in Endocrinology.

Dr. George A. Bates, Professor of Histology, Tuft's Dental School, Boston, Mass.

Orthodontic Treatment of Cleft Palate, Together with a Report on Some Cases.

Dr. Harry E. Kelsey, Baltimore, Md.

The Field of Muscle Training in Orthopedic Surgery.

Dr. Armitage Whitman, Assistant Surgeon of the Hospital for Ruptured and Crippled, New York.

Business Meeting and Election of Officers.

Nominations for Officers, 1922-1923.

President—Dr. Ira B. Stilson;

Vice-President—Dr. Alfred M. Desnoes;

Secretary—Dr. E. Santley Butler;

Treasurer—Dr. Walter S. Watson.

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Dinner at the Hotel Vanderbilt.
Ladies invited.

The dinner will be served promptly so that ample time will be given those who wish to leave for the theatre.

Chairman of Dinner Committee,
Dr. Alfred M. Desnoes.

Tuesday, May 23

A Consideration of Some of the Properties of Metals.

Dr. Frederic T. Murlless, Jr., Hartford, Conn.

A Review of Some of the Recent Literature on the Endocrine Glands.

Dr. Albert W. Crosby, New Haven, Conn.

President's Address.

Dr. C. A. Hawley, Washington, D. C.

Clinics:

Open Bite Cases.

Dr. A. LeRoy Johnson, Boston, Mass.

Lingual Retainer.

Dr. Alfred M. Desnoes, New York City.

(a) Auxiliaries for Root Movement on the Lourie High Labial Arch and the Lingual Arch.

(b) Sliding Lingual Arches for Root Development.

Dr. John Mills, Toronto, Canada.

Some Instruments I have Found Useful in My Practice.

Dr. J. Lowe Young, New York City.

Some Adult Cases.

Dr. Ira B. Stilson, Providence, R. I.

Some Points on Diagnosis and the Selection of Type of Appliances for Treatment.

Dr. George W. Grieve, Toronto, Canada.

A Simple Appliance for Retaining Normal Mesio-distal Relation of Molars.

Dr. Edward L. Mitchell, Indianapolis, Ind.

(a) Orthodontic Limitation in Type of Class One Cases, presenting three or four cases for discussion.

(b) A Failure.

Dr. B. W. Weinberger, New York City.

Subject to be announced.

Dr. William H. Pearson, Norfolk, Va.

The officers for 1921-1922 are as follows: President, Dr. C. A. Hawley, Washington, D. C.; Vice-President, Dr. Ira B. Stilson, Providence, R. I.; Secretary, Dr. E. Santley Butler, New York; Treasurer, Dr. Walter S. Watson, New York City; Executive Committee, Dr. F. C. Kemple, Dr. H. C. Ferris, and Dr. H. A. Pullen; Scientific Committee, Dr. W. S. Watson, Dr. F. S. Casto, and Dr. C. C. Howard.

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ORIGINAL ARTICLES

THE TREATMENT OF DISTOCLUSION*

By Herbert A. Pullen, D.M.D., Buffalo, N. Y.

DISTOCLUSION, as an orthodontic term, indicating the general malrelation of the dental arches, in which the mandibular dental arch is in a distal, or more correctly, a posterior position in relation to the maxillary dental arch, expresses concisely a class of malocclusion without the divisions and subdivisions, viz., Class II, Angle's classification. Through its use in this sense, one may with license discuss various special phases relating to its treatment, within the range of a short paper, and without the confusion of the multiplicity of description and illustration attendant upon an otherwise more elaborated exposition of the treatment in detail of its divisions and subdivisions which is no doubt familiar to most of the members of this society.

Hence the opportunity offered by the general use of the term, distoclusion, in discussing its treatment, is one which allows of a little greater freedom of discussion and of concentration upon other important general considerations of treatment of this class in an attempt to answer some of the queries and some of the recent criticisms that have been raised as to its operative treatment in especial relation to its etiology and diagnosis.

In order to carry out this intention, it is necessary to take an inventory, as it were, of the various symptoms of distoclusion, and to come to some conclusion as to the soundness, or otherwise, of certain theoretical and practical methods of treatment which have been in use by many earnest specialists in orthodontia, working from the basis of occlusion.

SYMPTOMATOLOGY OF DISTOCLUSION

The dental symptoms of distoclusion, as illustrated in Fig. 1, (Angle's classification of malocclusion), exhibit in both divisions the retruded man-

*Read before the American Society of Orthodontists, April 21, 1921.

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dibular dental arch, with protruded upper incisors in the second division. The full divisions are in bilateral, and the subdivisions in unilateral distal occlusion, the subdivisions exhibiting normal mesiodistal relations in one lateral half.

The facial symptoms exhibit correspondingly retruded mandibles in both divisions, the short upper lip and the open drooping mouth in the case of

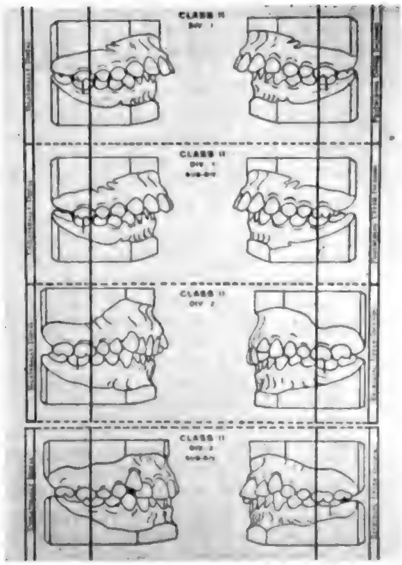

Fig. 1.

Fig. 2.

Fig. 3.

the first division, and the normal upper lip and the closed mouth in the second division of distoclusion.

The facial configuration in bilateral distoclusion of the first division, Figs. 2 and 3, is conformative to the malrelation of the underlying structure of the jaws and dental arches, Fig. 4, which necessitates the diagnosis of a case and the prognosis of its treatment from a study of the relations of occlusion primarily, as suggested by Angle, rather than from the unesthetic conformation of the features to the abnormal structures beneath.

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FUNDAMENTAL PATHOLOGIC CONDITIONS REQUIRING TREATMENT

A close analysis of the fundamental pathologic conditions which are observed in distoclusion reveals the following malrelationships, each requiring treatment, if present, in order to establish normal relations of occlusion, and normal facial lines:

1. Malrelation of the dental arches. Bilateral or Unilateral Distoclusions.
2. Maldevelopment of the dental arches.
   - (a) Narrow dental arches.
   - (b) Protruded or retruded maxillary anterior teeth.
   - (c) Shallow or deep overbite.
   - (d) Abnormal occlusal plane.
   - (e) Abnormal vertical development.
     - (1) Infraversion in premolar and molar region,
     - (2) Supraversion in incisor region.
     - (3) Possible infraversion in incisor region.
3. Malposition of individual teeth.
   - (a) Labioversion, linguoversion, torsiversion, infraversion, *et al.*
4. Malformation of individual teeth, supernumeraries, *et al.*

These malrelationships are named in a logical diagnostic sequence and not in the order of their consecutive treatment.

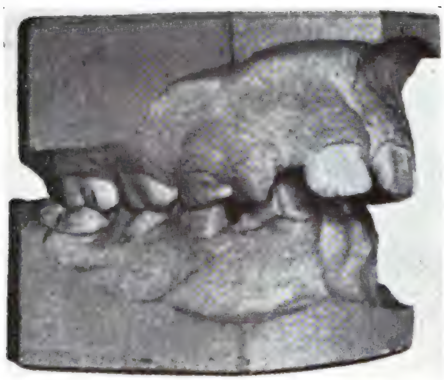

Fig. 4.

ETIOLOGIC CONSIDERATIONS IN TREATMENT

Malpositions of the teeth, in general, are but objective symptoms of abnormal development of the dental arches, and to go a step farther, the maldevelopment of the dental arches in any class of malocclusion, as well as in distoclusion, is often symptomatic of a deeper underlying *constitutional* rather than a *local* cause.

So-called local causes, such as adenoids, enlarged tonsils, mouth breathing, thumb sucking, and the like, while they have their influence in the malformation of the dental arches in distoclusion, yet each one has a deeper underlying cause to account for its own expression.

Some defective development along the respiratory tract, such as a narrow nasal passage due to some obscure developmental deficiency, may be the cause of the lack of full respiration, of adenoids, and mouth breathing. Likewise,

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some nervous reaction is the cause of thumb or finger sucking or like habit which may have a causative influence in distoclusion.

It must, therefore, be assumed that the causes of distoclusion are largely constitutional and not local, that the narrow dental arches, the narrow middle third of the face, the adenoids, and other respiratory obstructions are still only symptoms of deeper underlying and more obscure constitutional causes.

To illustrate these points, let us observe an extreme case of distoclusion (mutilated by extraction) the model shown in Fig. 5, and the profile in Fig. 6.

The photo, Fig. 6, of the patient possessing this distoclusion is illustrative of the effect on the whole body of the same causative factor responsible for the distoclusion, for the faulty respiration and for the lack of chest development, which are associated pathologic conditions in the case.

BIOLOGIC INTERPRETATIONS OF PHENOMENA OF DISTOCLUSION

The orthodontic problem, as recognized by the advanced student of orthodontia, is a problem of biology, and in the light of our present knowledge of

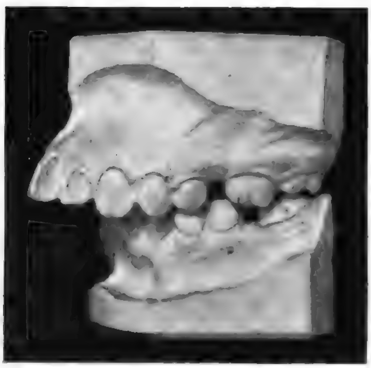

Fig. 5.

Fig. 6.

the subject, no phase of orthodontia, such as the treatment of distoclusion which we are discussing, can be studied without attempting to translate or interpret the biologic phenomena concerned with causative factors and to speculate as to their results on treatment and the stimulation to development of the dental arches.

Among the chief biologic factors in distoclusion is that of heredity, the import of which has always been confusing because of the difficulty of separating it from other causative factors, nevertheless it is a factor which must be reckoned with. "Heredity is today the central problem in biology," and it is as impossible to ignore it in the study of orthodontic problems as it is to ignore the laws of gravitation, and fearlessly walk out in a shower of hailstones and expect not to be hit.

Conklin says, "Whenever the differential cause of a character (resembling a parent) is a germinal one the character is, by definition, inherited; on the other hand, whenever this differential cause is environmental the character is not inherited."

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Let us observe what Conklin has to say on resemblances and differences between parents and offspring with the possibility of determining hereditary character: "On the other hand resemblances and differences between parents and offspring are not due to heredity at all, but to environmental conditions. By means of experiments it is possible to distinguish between hereditary and environmental resemblances and differences, but *among men where experiments are out of the question generally it is often difficult or impossible to make the distinction.*"

I am inclined to believe that there are certain cases of distoclusion of

Fig. 7.

Fig. 8.

Fig. 9.

hereditary origin recognizable simply from macroscopic observation in spite of what Conklin has to say on the subject, but I do not believe that it is possible to be certain of such a diagnosis of an hereditary cause of distoclusion at the early age when distoclusions present and should be treated.

Granting, however, that a certain distoclusion of early childhood was suspected to be of hereditary origin and it seemed advisable to wait until the eruption of the permanent teeth to decide this question in order to carry out the principle of extraction of two mandibular first premolars, for example, and retruding the protruding maxillary incisors and canines, one would have to allow the dental arches to remain in their undeveloped and malrelated con-

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dition until the eruption of the canines or until about eleven years of age before beginning treatment, losing those preceding years of childhood when natural growth might aid most in developing the dental arches under proper artificial stimulation by orthodontic means.

Again, the weakened and deficient muscular function in these cases would also have to await the age of eruption of the premolars allowing an intervening growing period of childhood to elapse which might have been to its greatest advantage in strengthening and developing these undeveloped muscles by proper exercise.

RATIONALE OF EARLY TREATMENT OF DISTOCLUSION

There seems to be a considerable difference of opinion among orthodontists as to the proper age to treat distoclusion, some advocating the early treatment of the distoclusion in the deciduous arches. One might not find

Fig. 10.

Fig. 11.

any advantage to accrue in beginning the treatment thus early, as occasionally the distoclusion reappeared later in the "mixed denture," with possibly a deep overbite as well. However, when one considers the possibilities of directing the developing jaws toward their normal relationship by orthodontic means, and the strengthening of weakened muscles of the jaws and face at this early age, it is impossible to disregard this early treatment as of no avail.

Again, for the same reason it seems consistent to treat distoclusion of the "mixed dentures" before the loosening of the deciduous molars, using the first permanent molars for anchor teeth for appliances to develop the dental arches and to shift the occlusion and change the deep overbite when present in these cases.

To illustrate the value of such early treatment of distoclusion, even in cases of suspected hereditary origin, the writer has selected a case of distoclusion of the age of nine years, the origin of which seemed clearly of an

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hereditary nature, and in Figs. 7, 8 and 9, exhibits the stages of treatment up to and through the eruption of the permanent teeth except the third molars.

Thus, in the three stages of treatment of this distoclusion case, the treatment was carried out according to the idea of growth stimulation during the growth period of childhood, the dental arches being developed and the occlusion shifted to normal, and retained until the eruption of the canines, premolars and second molars, at the same time strengthening the weakened facial muscles by the intermaxillary forces applied.

The beneficial effects in obtaining more esthetic relations in the profile and eliminating abnormal facial lines is very marked as shown in the contrast between the before and after treatment photographs in Figs. 10 and 11.

At the same time also, in this case, blocked respiratory channels in the nose and throat were freed by rhinological operation, and although this case was treated some years ago before exercises for weakened muscles were deemed necessary, the facial lines after treatment are sufficient answer to the question of advisability of early treatment, even in cases of suspected hereditary origin. Nor would it seem advisable to wait until the eruption of the permanent teeth to be certain of a diagnosis of hereditary origin before beginning orthodontic treatment with the wonderful possibilities of growth of the dental arches under such treatment, and the restoration of lines of beauty to the face.

Thus the problem of distoclusion, even with possible hereditary factors present may be one of associated maldevelopment of the dental arches due to a lack of sufficient stimulus to growth and *the most beneficial local therapeutic agencies are those which supply that stimulus during the growing period of childhood.*

GROWTH STIMULATION IN DISTOCLUSION A BIOMECHANICAL PROCESS

Hence, the *"biomechanical"* processes of growth stimulation to the maldeveloped dental arches in distoclusion are the main reliance of those orthodontists who believe in the possibilities of thus assisting the dental arches to grow out of their malrelationship until proper and sufficient function shall have been established to retain the normal relations of occlusion which may have been obtained.

We are indebted to Dr. Hellman for the coining of this very apt term "biomechanics" to describe the gentle artificial stimulus to growth obtained through the use of appliances, meaning by the fusion of the word *biology* and *mechanics,* the biologic manifestation obtained as a result of the mechanics applied in the delivery of a force, and its coming is very opportune in view of the vital and mechanical processes which are alike concerned in treatment of malocclusion.

NECESSITY OF DISTINGUISHING BETWEEN TREATMENT OF CHILDREN'S AND ADULT CASES OF DISTOCLUSION

In accordance with the previously described reasons for the early treatment of distoclusion it is necessary to distinguish sharply between the treatment of distoclusion of children from seven to fourteen years, and of the

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adults beyond the age of fourteen in whose mouths the dental arches are so nearly fully grown in their malocclusal relations that artificial stimuli to growth is much less liable to produce successful results, and the necessity for improvement of the facial lines by another method than a dental arch development and a mesio-distal change in occlusion may have to be considered.

Leaving the consideration of the adult distoclusion for discussion in the latter part of the paper to avoid confusion, let us consider further the treatment necessary in the younger cases in which growth of the dental arches as well as of the body as a whole must be considered together.

Inasmuch as the symptomatology reveals disturbances of a systemic as well as a local nature, the treatment of these cases should be *constitutional* as well as local.

CONSTITUTIONAL TREATMENT IN DISTOCLUSION

Recognizing the constitutional disturbances as the most serious cause of the maldevelopment of the dental arches as well as of the body as a whole, a thorough physical examination of the child should be made and proper therapeutic procedure instituted according to the needs of the individual case.

For example, if the respiratory system is faulty, the respiratory channels blocked by adenoids or diseased tonsils should be freed by operation, and proper breathing and physical culture exercises given for chest development.

If the child with distoclusion exhibits malnutrition, special diets should be instituted for building up the system to a normal vital standard. If the patient is lacking in the thyroid or pituitary stimulation to growth, the prescripting of extracts of these glands may have a beneficial effect.

Maldevelopment of the body as a whole from unknown causes will have to receive the proper attention at the hands of the experienced physician, although it may be difficult to get any results from experimental treatment.

Hereditary influences have already been discussed, and although in adult cases, the stamp of heredity is confirmed beyond all possibility of change by growth processes, in suspected cases of hereditary origin in childhood, decided improvement in growth processes and in restoration of occlusion and facial lines is possible. It is possible, of course, that a case may be partly hereditary and partly of some other etiologic origin which might account for the great improvement in these cases when the supposedly insurmountable stamp of heredity is present.

TREATMENT OF WEAKENED MUSCULATURE

Most of the severe cases of distoclusion, of Class II, first division, Angle's classification, exhibit such lack of development of chest muscles as well as the muscles connected with the jaws that general posture exercises should be instituted in the treatment and also special exercises for developing the weakened and deficient muscles of the jaws such as have been described by Dr. A. P. Rogers in several recent monographs.

Fig. 12 illustrates one position of the general posture exercises for developing the bodily musculature along normal lines as well as for strengthening

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the weakened jaw muscles in distoclusion. These exercises are of especial benefit, and at the present time, seem to hold out the greatest promise for permanent results in treatment of any therapeutic agency.

Some cases of distoclusion have been treated successfully by Dr. Rogers by means of these exercises alone as he has shown. The papers by Dr. Rogers

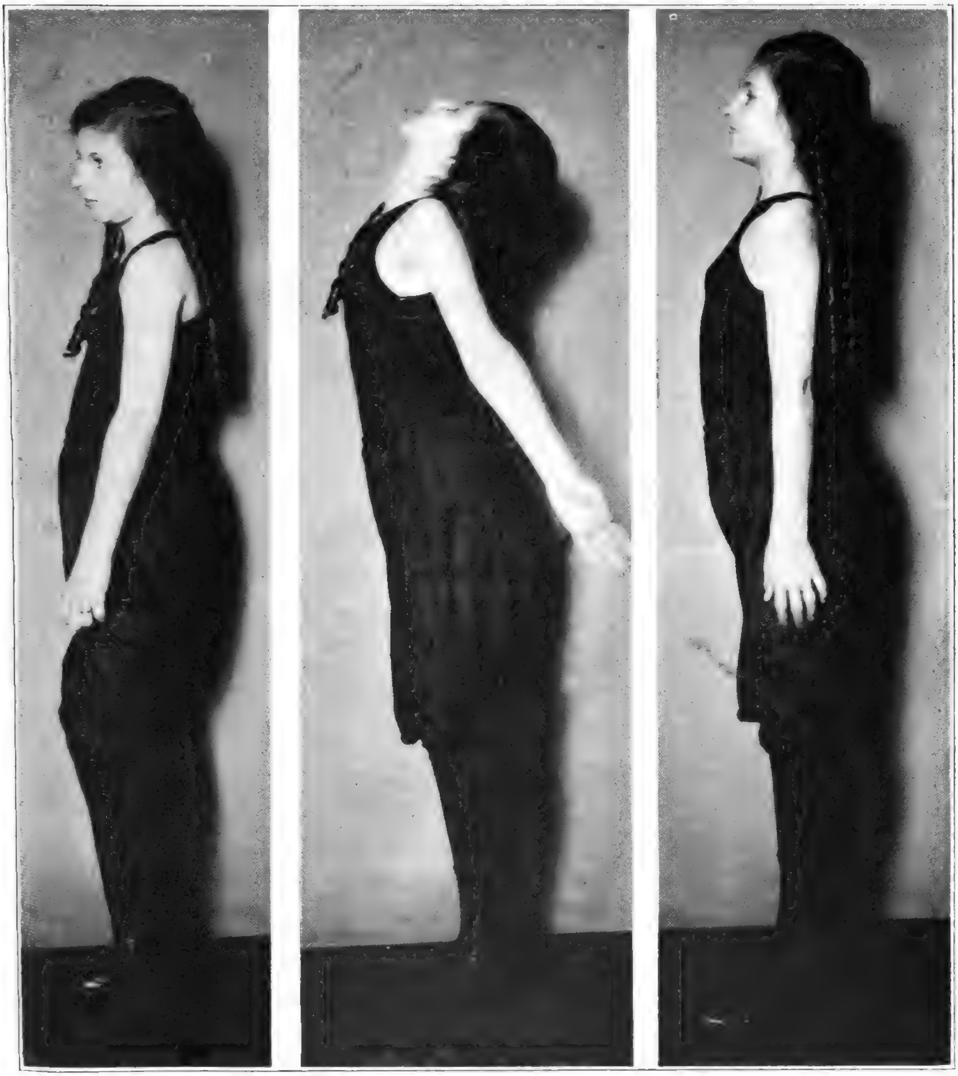

Fig. 12.

on this subject have given the greatest impetus and encouragement in the treatment of distoclusion of any recently propounded therapeutic auxiliary in these seriously deformed cases.

HABITS AND THEIR TREATMENT

Habits of lip biting, thumb, finger and tongue sucking require special counteractive remedial agencies, mechanical and psychological.

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Protruding points on orthodontic appliances which will cause interference with the lips in biting may have some deterrent effect in the lip-biting habit, and the wearing of aluminum mittens will help to cure the thumb-sucking habits, unless the patient is too old to wear them, when it is too late to use mechanical deterrents. In these cases every effort should be made to increase the patient's will power to overcome the habit. The power of auto-suggestion is very valuable and is often sufficient to effect a cure of these harmful habits. The substitution of other unharmful habits is a sound psychologic principle and may be used to advantage in habit cases.

LOCAL TREATMENT OF DISTOCLUSION THROUGH GROWTH STIMULATION

The local treatment of distoclusion refers especially to growth-stimulating by the use of appliances for the development of normal arch form, arch

Fig. 13.

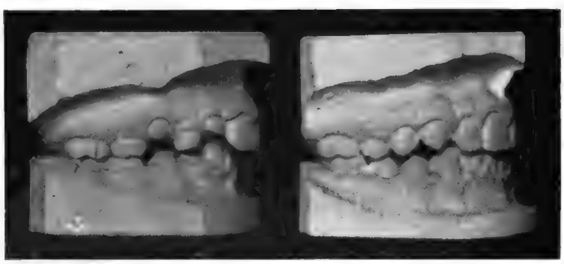

Fig. 14.

relationship, and the correction of individual tooth malpositions, establishing the normal function of the teeth in occlusion.

The forces applied for this purpose in early childhood should be stimulative to growth rather than excessive in amount and the appliances delicate and inconspicuous, and applied so that they interfere the least with speech, mastication, or the natural prophylactic functions in the oral cavity.

CLASSIFICATION OF TREATMENT OF DISTOCLUSION

For the sake of clarity and a better understanding of the different phases of treatment of distoclusion, the writer has divided the forms of distoclusion into three classes which range from the simple to the most extreme complications, and has designated them as *simple, compound* and *complex.*

Simple cases represent those cases of distoclusion which require the use of

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appliances for restoring the proper form and size of the dental arches without the use of appliances to make the mesiodistal change.

Compound cases require appliances both for the establishment of normal arch form and size and for the mesiodistal change in occlusion.

Complex cases include all of those more complicated cases which require special treatment for the correction of the abnormal overbite, abnormal occlusal plane and various other abnormalities not included under the simple and compound cases.

TREATMENT OF SIMPLE CASES

In the simple cases of distoclusion either of the first or second division with a normal overbite, the establishment of the proper size and form of each dental arch by expansion, and the correction of the malposition of individual teeth, especially the canines, and first molars, will occasionally be all that is necessary to unlock, as it were, the slightly retruded mandibular dental arch so that it can move forward of its own volition without the use of a mesiodistal force. Figs. 13 and 14 illustrate such a simple case of distoclusion, requiring simply the expansion of the dental arches, especially in the upper

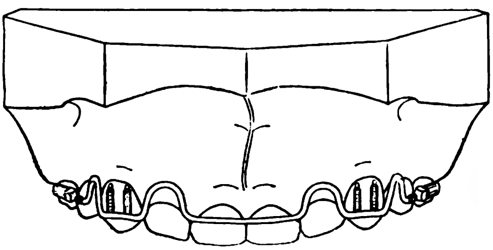

Fig. 15.

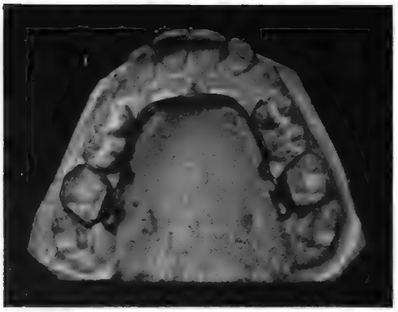

Fig. 16.

canine region, so that the mandibular dental arch could assume its proper forward pose without mechanical hindrance. Often the rotation of lingually rotated first molars, above or below, will be found to be the particularly necessary tooth movement required to establish their normal relationship and allow the mandibular arch to move forward to normal mesiodistal relations.

Again, the development of the anterior part of the dental arches so that the canines above and below can find their occlusion will be found to be the special tooth movement to accomplish in order to establish the mesiodistal change. The delicate .030″ expansion arch on the maxillary dental arch attached to the molar bands by either horizontal or vertical tubes, and to the deciduous canine bands by the pin and tube attachment as shown in Fig. 15, very efficiently controls the expansion of the arch and the relation of the molars in these simple cases of distoclusion. The appliance in the illustration is a pin and tube appliance designed by Dr. J. Lowe Young. This appliance can be constructed with loops, or the arch wire can be indented in the embrasures of the anterior teeth sufficiently so that the desired amount of anterior expansion can be obtained by straightening out the indentations.

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In the simple cases, the mandibular dental arch is held back of its normal mesiodistal position by the narrow maxillary arch, which when widened, unless the first molars are rotated or other malpositions of the teeth interfere, allows the mandibular dental arch to move forward into a normal and more comfortable position with the normal cusp relationship established.

Fig. 16 exhibits the use of the lingual arch for expanding the maxillary dental arch anteriorly so that the mandibular arch can move forward to normal occlusal relations with the maxillary.

The simple cases of distoclusion of either the first or second division are amenable to treatment by the use of various appliances for dental arch expansion from the plain alignment wire to the ribbon arch applied labiobuccally, or the lingual wire, in its various forms. As a prophylactic measure, whenever it is possible to use the lingual wire in the simple cases, the labial and buccal surfaces of the teeth are kept free from appliances, and there is much less chance for the accumulation of food particles on the teeth or appliance as in the case of the labial wires.

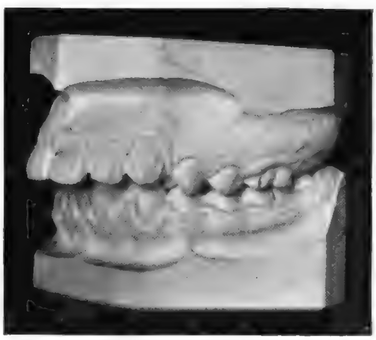

Fig. 17-*A*.

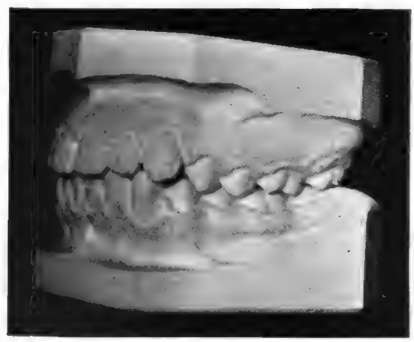

Fig. 17-*B*.

In the treatment of the simple cases of distoclusion, the exercises for weakened jaw muscles should be instituted just the same as in the more extreme cases of distoclusion as a matter of precaution by strengthening these muscles in their normal pose. *Bodily movement* of the teeth in distoclusion while of greater importance in the complex and compound cases, should be taken advantage of when indicated in *simple cases* also by the use of the various forms of stationary buccal or lingual attachments. In the movement of teeth other than anchor teeth with the lingual wire, Nature's own forces of tongue and lip pressure and the interstitial building up of the osseous structures supporting the teeth through the gentle stimulation of the lingual wire and the restoration of function will be found sufficient for proper arch development without the use of special attachments for bodily movement.

TREATMENT OF COMPOUND CASES OF DISTOCLUSION

Compound cases of distoclusion require a *mesiodistal force* in addition to the treatment accorded simple cases in arch expansion and correction of malposition of individual teeth in order to establish the mesiodistal change, there

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being no further complication such as the excessive overbite, etc., to consider. Figs. 17 and 18 exhibit a compound case of distoclusion before and after treatment in which the restoration of arch form and mesiodistal change in occlusion constituted the main features of treatment, the overbite being normal. The appliances used in treatment in this case were the plain threaded alignment wires fitted into horizontal buccal tubes on molar bands (Fig. 19), the anterior teeth being ligated to the alignment wires until arch size and form in both maxillary and mandibular wire was restored. The width of the arches should be retained at this time by lingual retainers which allow of more or less mobility to the teeth. Intermaxillary force may be applied

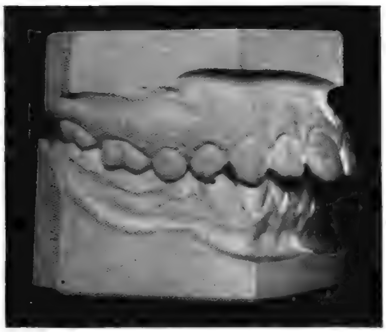

Fig. 18-*A*.

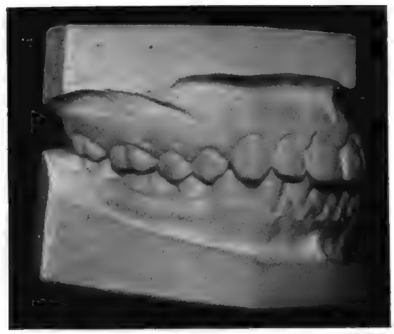

Fig. 18-*B*.

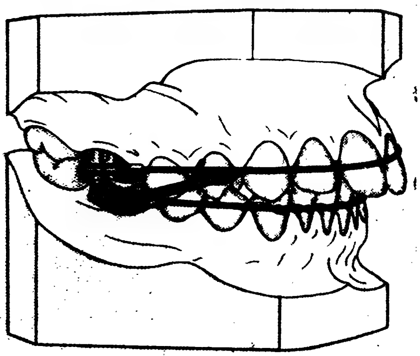

Fig. 19-*A*.

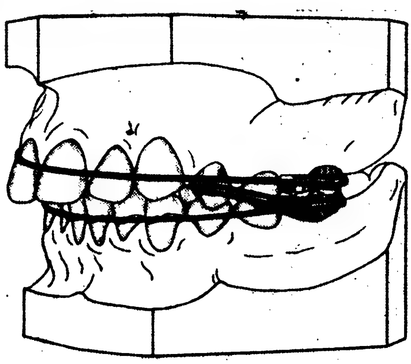

Fig. 19-*B*.

before the restoration of arch form, as shown in Fig. 19, but it usually displaces ligatures and retards the treatment. Preferably, the form and size of each arch should be restored first, and retained, and then the maxillary alignment wire replaced in position with intermaxillary elastics applied from hooks on the maxillary alignment wire to buccal hooks on the mandibular molar bands as in Fig. 20, and this treatment continued until the occlusion has been shifted to normal. Such a combination of labial and lingual wires, combined with intermaxillary force conforms better to the mechanical, esthetic and prophylactic requirements of today, where inclination movement only is necessary, than the use of more complicated appliances requiring the use of multiplicity of individual tooth bands.

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For many years the plain threaded alignment wires have been used in these cases for the establishment of normal arch form, to correct the malpositions of individual teeth, correct inclination of incisors, and through the auxiliary use of *intermaxillary force* to correct the mesiodistal malrelation of the arches. In spite of the many improvements in appliance construction the plain threaded alignment wire oftentimes will enable one to control all of the teeth of both arches with a greater degree of mobility of individual teeth than some of the improvements on this form of appliance. Especially is the application of the plain alignment wire useful on the maxillary arch wire after proper arch form has been attained and lingually retained, the labial alignment wire being free from ligatures to individual teeth, the application of intermaxillary force thus allowing of a change in position of the horizontal alignment of the alignment wire, thereby aiding in prophylaxis.

The writer has found it to be especially advantageous to use a rather heavy gauge alignment wire for the anchorage support of the intermaxillary

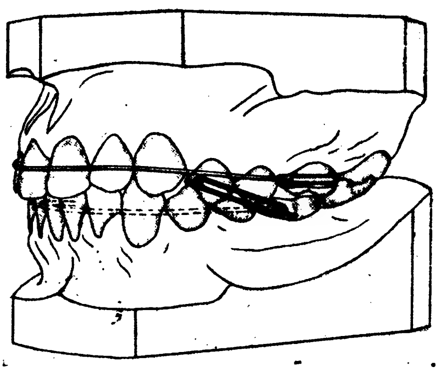

Fig. 20.

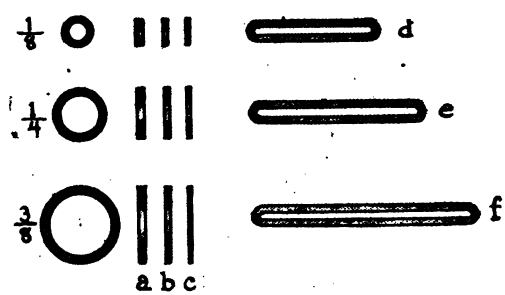

Fig. 21.

force, in producing the mesiodistal change, as in Fig. 20. In most of these compound cases uncomplicated by multiple tooth malpositions very few ligatures are required upon the maxillary anterior teeth in reducing the inclination of the incisors in the first division of Class II.

Combined with this maxillary labial alignment wire is a mandibular lingual wire varying from the fixed or removable form of pinched wire arch to the removable lingual appliances with auxiliary springs for expansion.

INTERMAXILLARY FORCE

The intermaxillary elastics should be gauged according to the degree of force required, beginning with light elastics, increasing to heavier, and ending at retention with the lightest elastic that will retain the mesiodistal change. The combination of appliances shown in Fig. 20 may be worn for retention, the maxillary labial alignment wire being finally worn only at night with very light elastics before completion of the case.

The chief force in effecting the mesiodistal change in distoclusion is the intermaxillary force produced by the use of elastic rubber rings preferably

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cut from new Para black rubber tubing. The writer has found that better results are obtainable from having a series of graded sizes of these rubber rings cut from three sizes of tubing, Fig. 21, each size of tubing being cut into rings of three different sizes, *a, b, c,* and marked thin, medium and thick.

The thin size, *c,* of the large diameter tubing ⅜ inch internal diameter should be used at first, until the patient gets used to the tension, the medium size, *b,* next, and the thick size *a* next, thus increasing the tension by degrees instead of beginning with the maximum force.

The next size smaller ring, ¼ inch internal diameter may be used in the same manner in many cases, especially where the hooks on maxillary alignment wires and mandibular molar bands are not far apart. A record should be kept of each change of size of the rubber rings, so that there may be continuous progress in the case from the use of the minimum to the maximum force.

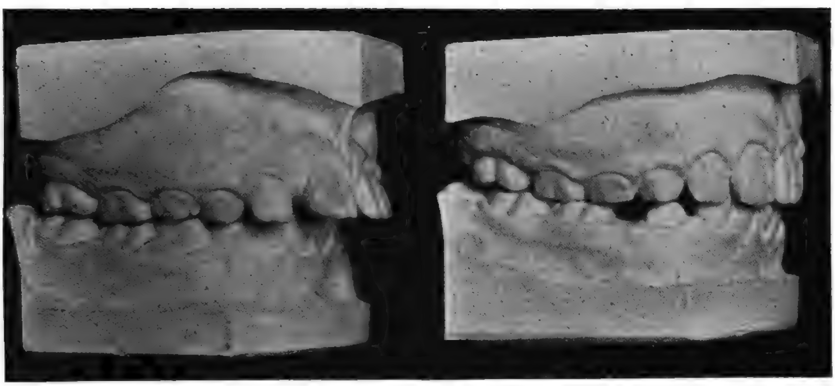

Fig. 22.

CHOOSING APPLIANCES ADAPTED TO ONE'S SKILL

It is always praiseworthy to have the courage of one's convictions, and in this connection I wish to quote the following paragraphs from a paper of Dr. Milo Hellman; "the treatment of malocclusion of the teeth today and the progress in the near future depend not so much on the form of the appliance in vogue, but rather on the artistic skill and natural talent of the individual employing it," * * * "The plain alignment wire, despite the 'ancient history' has been the means of obtaining *considerable* good results, and in more instances than any other one appliance."

"As a word of caution to the uninitiated, it may be said that it is often more advisable to cling to that type of appliance that one becomes proficient in than to relinquish this proficiency for a superior appliance and take the chance of developing therewith an inferior technic. In other words, it is better to be the possessor of such skill as to be able to control the appliance than to possess an appliance that will control one's skill."

In describing first the use of the plain alignment wire for the treatment of distoclusion, the writer does not wish to recommend them as the best ap-

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pliances for use in these cases, for there have been many improvements in the form, size and adaptation of these appliances, most of which are excellent, although some of them are complicated enough so that their efficient use in distoclusion cases is beyond the skill of those operators who have not thoroughly mastered the technic of these newer appliances.

It might be further stated that the newer appliances are more useful and efficient in direct ratio to the degree in which they facilitate progress in treatment by providing bodily movement of teeth when indicated, and allowing of better prophylactic conditions in the mouth.

Fig. 22 exhibits a compound case of distoclusion in which there is con-

Fig. 23.

Fig. 24.

siderable labial inclination of the maxillary incisors associated with narrow dental arches, a shallow overbite, and a bilateral distoclusion.

Fig. 23 illustrates the use of Dr. Lourie's high labial wire to reduce the inclination of the incisors in this compound case of distoclusion, and is an ideal inconspicuous appliance for this purpose. At the same time the intermaxillary elastics may be attached for shifting the occlusion.

The removable lingual appliance of Dr. Mershon's with the auxiliary springs may be used at the same time to expand or develop the maxillary arch laterally as shown in Fig. 24.

The removable lingual pinched wire arch of Dr. Lourie's is here seen as the only mandibular appliance necessary.

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BODILY MOVEMENT OF TEETH IN COMPOUND CASES OF DISTOCLUSION

In certain of the compound cases of distoclusion where the dental arches are very narrow and where there is considerable inclination of the incisors, bodily movement of the teeth is indicated. Fig. 25 illustrates the use of the pin and tube appliance with half round tube lock on the molar band for treatment of a case of bilateral distoclusion in connection with the use of intermaxillary force. Although the pin and tube appliance has fallen somewhat into disuse of late on account of its interfering to some degree with the mobility of the teeth, yet in a simple form, with the least number of incisor bands, it is useful, and should not be thrown into the discard inadvisedly.

The ribbon arch, which has superceded the pin and tube appliance, admirably answers all of the requirements for an appliance for bodily movement when indicated in distoclusion.

Fig. 26 illustrates its application on both mandibular and maxillary dental arches in a bilateral distoclusion case with protruding maxillary incisors.

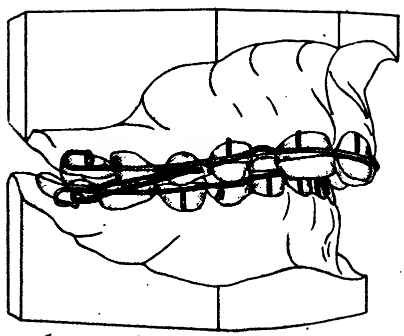

Fig. 25.

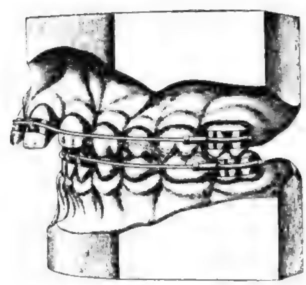

Fig. 26.

TREATMENT OF COMPLEX CASES OF DISTOCLUSION

Complex cases of distoclusion are complicated to the extent of requiring treatment of the abnormal overbite and abnormal occlusal plane. In addition, therefore, to the treatment necessary for a compound case of distoclusion, special treatment in a complex case must be instituted for the control of the deep overbite, for supra and infraclusion of the anterior teeth, and for the control of the abnormal occlusal plane, and especially in the establishment of the vertical development in the molar region where infraclusion is in evidence.

SPECIAL TREATMENT OF THE DEEP OVERBITE

In the majority of cases of Class II, Div. 1, the persistence of the deep overbite is such an obstacle to the attainment of normal occlusal relations that especial adjunct appliances should be utilized for the correction of the deep overbite, or rather the development of the proper curve of the occlusal plane.

There have been three methods in use for this purpose, one by the use of an auxiliary inclined plane lingual to the maxillary incisors, in connection

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with scientifically applied intermaxillary force, another by the building up of occlusal surfaces of the deciduous molars by crowns to open the bite, and third, by the use of the alignment wire as a double lever in extruding the premolars and intruding the incisors in one or the other of the dental arches. The latter method, however, is not adaptable to the "mixed denture" being especially applicable to the permanent denture, as will be later illustrated.

Without going into the history of the use of the inclined plane, several of the latest improvements or modifications of it in connection with the treatment of the deep overbite in Class II, Div. 1, of distoclusion will be described.

The rubber roofplate, Fig. 27, with an inclined plane on its anterior edge used in conjunction with the alignment wires and intermaxillary force

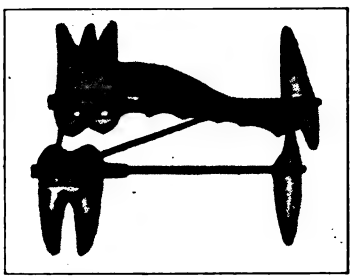


Fig. 27.

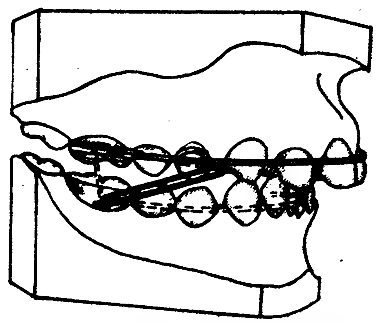
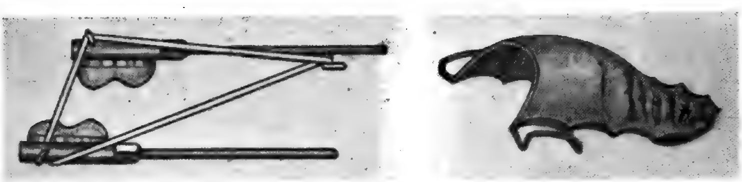


Fig. 29.



a *b*

Fig. 28.

is a well-known method of development of the regions of deficient growth in the vertical plane. In Fig. 28 *b* is illustrated an improvement of the roofplate for this purpose in the addition to crib attachments for deciduous molars or premolars. The triangular arrangement of the intermaxillary elastics for assisting in vertical development in the molar and premolar region is shown in Fig. 28 *a*. A combination of the roofplate with inclined plane with maxillary labial alignment wire, mandibular lingual appliance and intermaxillary elastics is shown in Fig. 29, the mandibular incisors occluding with the inclined plane of the roofplate. If a labial alignment wire is used for the expansion of the mandibular appliance in the beginning, a removable mandibular lingual appliance may later be substituted for this labial alignment wire and should be made as mobile as possible in its attachments in order that the mandibular molars may be free to move in the direction of the forces

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exerted upon them mesially and vertically. The dynamics of this combination of the inclined plane and intermaxillary force exerted in the form of the triangle is shown in Fig. 30, the dotted line *DC* representing the resultant of the mesial and vertical forces of the intermaxillary elastics *KED*, this resultant force acting to develop the dental arches vertically and shift the occlusion from distal to normal at the same time.

As a delicate and efficient substitute for the roofplate the inclined plane has been constructed upon a removable lingual wire as in Fig. 31, a new layer of metal being added occasionally as the necessity indicates. Inclined planes of metal upon individual incisor bands have been used to give greater freedom and mobility of tooth movement in cases of deep overbite.

Loops of wire have been successfully adapted as inclined planes on anterior teeth as shown in Fig. 32, a suggestion of Dr. Hawley. This form

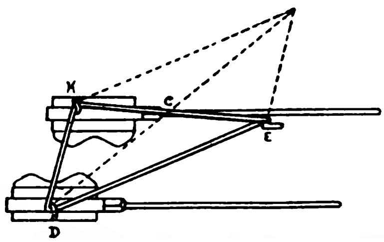

Fig. 30.

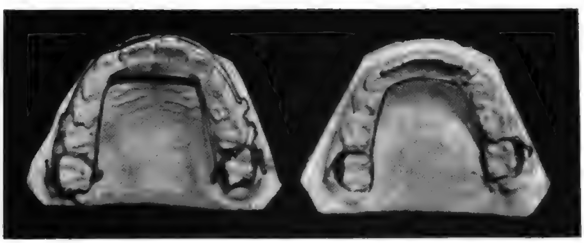
Fig. 31.


Fig. 32.

of inclined plane allows of the greatest freedom of individual teeth, and of better prophylactic conditions.

These inclined planes upon rubber roofplates, lingual wires or individual teeth are more adaptable for the treatment of "mixed dentures," by extruding the first molars to a new level and thus providing the proper plane of occlusion to which the premolars will later erupt, while in the more mature cases with canines and premolars erupted, the occlusal plane is already formed upon the abnormal curve, necessitating a correction of this curve before the distal occlusion can be corrected. The inclined plane is not, therefore directly adaptable for the correction of the abnormal curve of the occlusal plane, although it has been used to correct the abnormal overbite even in some of the most extreme cases.

The second method of correcting the deep overbite or abnormal plane of occlusion by vertical development in the molar region depends for its applicability upon the stability of the deciduous molars, and can only be accom-

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plished by initiating treatment some little time previous to the absorption of the roots of these teeth. A radiograph will determine whether absorption of the roots of the deciduous molars has begun, and if it has progressed to any extent, the method should not be attempted.

In brief the method consists of crowning the deciduous mandibular molars and thus opening the bite until the first permanent molars can be erupted to the proper occlusal plane. Fig. 33 illustrates the combination of crowns on mandibular deciduous molars, alignment wires on the maxillary arch, labial or lingual appliance on the mandibular arch, and intermaxillary face applied triangularly to get vertical development as well as a mesial shifting of the occlusion of the mandibular teeth.

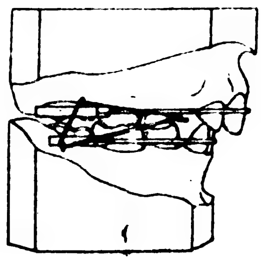

Fig. 33.

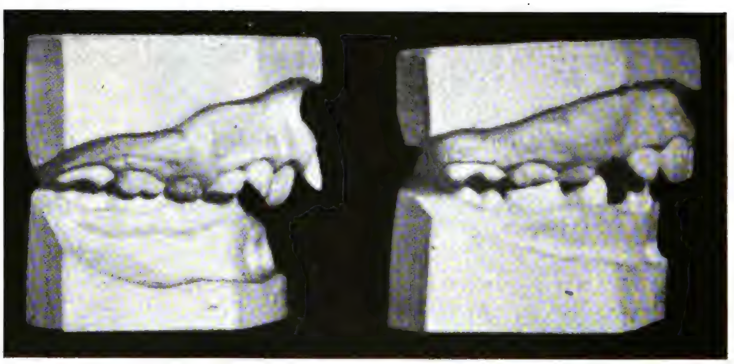

Fig. 34.

Fig. 34 exhibits two stages of the treatment of second division case of distoclusion.

Dr. J. Lowe Young has devised an unique method of casting crowns for the first and second deciduous molars on each side in one piece and cementing these cast crowns into position.

TREATMENT OF THE PERMANENT DENTURE IN DISTOCLUSION, (CLASS II DIV. 1. ABNORMALLY DEEP OVERBITE)

The treatment of the permanent dental arches in this division of Class II, on account of the abnormal relations of the occlusal plane and the overbite, which is already firmly established, may be conducted along somewhat

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similar lines to those suggested for the treatment of the "mixed dentures" except in those cases exhibiting a marked deviation of the occlusal plane from the normal in either dental arch.

The abnormal curve of the occlusal plane, strange as it may seem, does

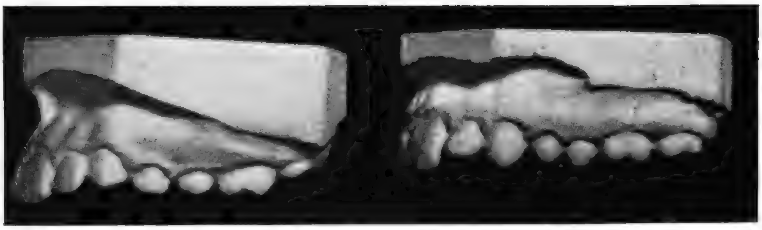

Fig. 35.

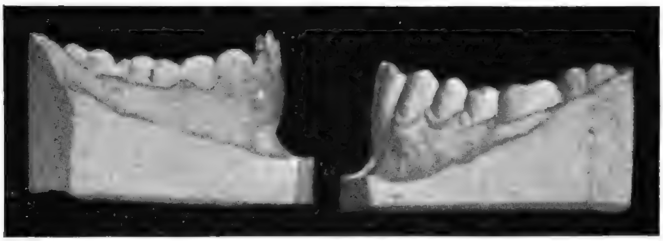

Fig. 36.

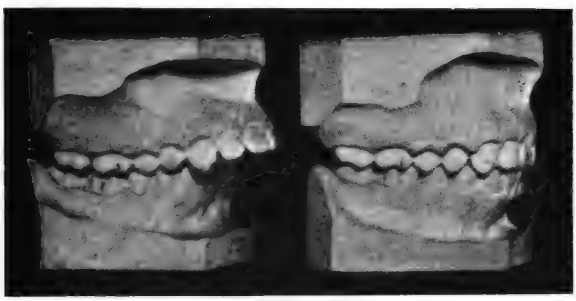

Fig. 37.

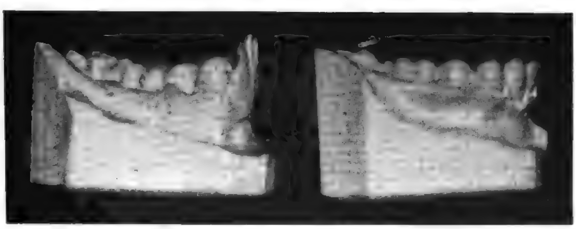

Fig. 38.—Showing abnormal curve of occlusal plane of mandibular arch of case shown in Fig. 37.

not usually occur in both dental arches to the same extent, and may be more abnormal in the mandibular in one case, and in the maxillary in another. Fig. 35 illustrates the abnormal curve greater in the mandibular arch than in the maxillary and Fig. 36 exhibits the abnormal curve greater in the maxillary than in the mandibular.

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The correction of the abnormally short curve is produced in the same manner in either the maxillary or lower arch by means of a small gauge alignment wire used as a double elastic lever. The dental arches should first be expanded to their proper size and shape and a delicate .030″ alignment wire then arranged as a double elastic lever upon the dental arch which exhibits the shorter and more abnormal curve.

An adult case of Class II, Div. 1, exhibiting the abnormally deep over-

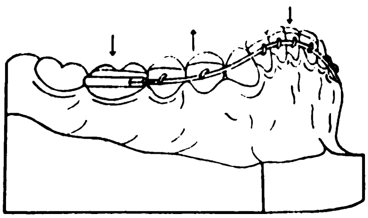

Fig. 39.

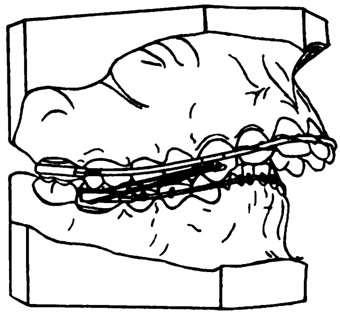

Fig. 40.

Figs. 41 and 42.

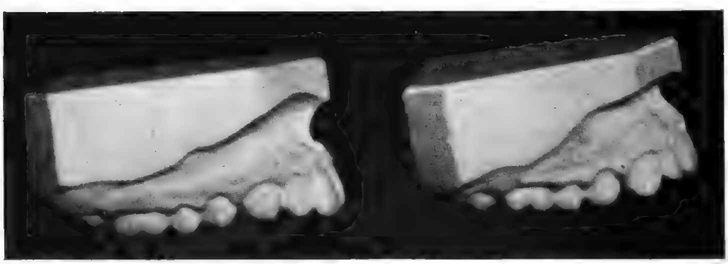

Fig. 43.

bite, and with abnormal curve in the occlusal plane of the mandibular arch is shown in Figs. 37 and 38 in the before and after treatment casts.

In Fig. 39 is illustrated the alignment wire used as a double elastic lever upon the mandibular arch of the case shown in Fig. 37 to extrude the premolars, intrude the incisors, and correct the abnormal curve of the occlusal plane. Fig. 40 exhibits the combination of appliances used in the case to correct the distal occlusion, after the force of the double elastic lever was well under way in its work upon the mandibular dental arch.

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Figs. 41 and 42 exhibit the change in the profile of the case shown in Figs. 37 and 38, after treatment. The patient was 17 years old, and for this reason this pleasing result was all the more gratifying in view of the overcoming of the unusually difficult obstacles in the case.

The writer has modified the double elastic lever to a considerable extent changing it from the heavier threaded wire to the threadless alignment wire of .025″ to .030″ in diameter as in Fig. 39, making the appliance much more delicate, yet of greater usable resiliency or elasticity.

As the premolars are extrüded and the incisors intruded the arch wire will need to be bent to continue the exertion of the reciprocating force until the proper plane of occlusion has been obtained, which will be indicated by

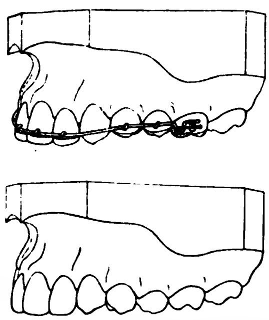

Fig. 44.

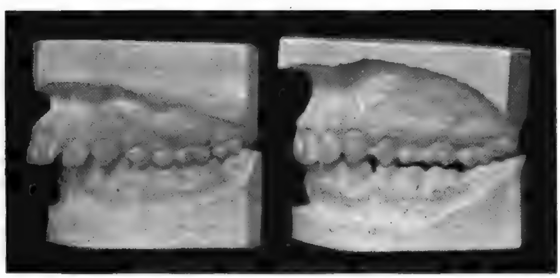

Fig. 45.

the normal overbite of the incisors, when the completion of the case will require the shifting of the occlusion from distal to normal, although in some cases this will occur naturally without resorting to intermaxillary force.

In distoclusion cases in which the abnormal occlusal plane is found in the maxillary arch as in Fig. 44, exhibiting the before and after treatment casts, with the deep overbite in evidence, the change must be made in the curve of the maxillary occlusal plane in a manner similar to that of changing the mandibular occlusal plane.

The appliances used in the maxillary arch in this case consisted of a .030″ labial arch, (Fig. 45) attached by vertical half round tubes to molar bands, extending above spurs on premolar bands and under spurs on incisor bands. The drawing in the lower half of Fig. 45 shows the change in occlusal plane after treatment.

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COMPROMISE TREATMENT

I have said nothing about "compromise treatments" or cases in which extraction is advisable for it would confuse the principles outlined in the paper.

Suffice it to say that I have extracted in very few cases of distoclusion in twenty years' practice of orthodontia as a specialty and I know that I will be supported in the claim that extraction of teeth for these cases should be the last resort rather than the first.

In cases in which I could only get a partial shifting of the occlusion, as shown in Fig. 45, I have found that the facial results were so much more pleasing than they would have been if I had extracted, that I have retained these cases in as perfect a condition as I could get them and rested satisfied with the results accomplished.

The facial profile of this case, Figs. 47 and 48, will illustrate exactly what I mean and there would be no question but that extraction would do harm rather than benefit in the case.

Figs. 46 and 47.

In briefly summarizing the main points of the paper I have stressed the following phases of distoclusion:

1. Distoclusion is primarily diagnosed or determined from the distal relation of the mandibular dental arch to the maxillary, the facial configuration conforming to underlying structural malrelationships. This diagnosis from the standpoint of occlusion is diametrically opposed to the method of diagnosis of malocclusion or dentofacial deformities from the facial lines.

2. The fundamental pathologic conditions in distoclusion were enumerated in a logical diagnostic sequence.

3. The etiology of distoclusion was considered from a constitutional rather than a local cause, to show the limitations of local treatment and to recommend the advisability in these cases of indicated constitutional treatment by the general physician, as well as by the freeing of blocked respiratory channels by the rhinologist.

4. The influence of heredity upon distoclusion cases has been suggested as well as the possibility of its association with other acquired etiologic fac-

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tors, and the advisability of treating the youthful cases of a suspected hereditary type in the same manner as nonhereditary types of distoclusion.

5. The proper period for beginning treatment of distoclusion was suggested as being in early childhood before confirmation of deformity through age could have its effect and when growth stimulation through biomechanical processes of orthodontic treatment can be best taken advantage of through a growing period of childhood.

6. The value of strengthening weakened muscles of the chest and jaws so noticeable in distoclusion cases was stressed, and special exercises recommended for developing these muscles.

7. The effects of habits of lip biting, thumb, finger and tongue sucking were noted as frequent concomitant features of distoclusion cases requiring special attention and remedial measures.

8. The forms of distoclusion presenting were divided into three classes, simple, compound and complex, in order to more clearly describe the essential features of treatment, each succeeding class beyond the simple cases presenting more complications in symptomatology and treatment.

9. The various phases of treatment of these three forms of distoclusion were described and illustrated. Some of the earlier and more simple forms of appliances were recommended where a sacrifice of skill and efficiency would have to be made in the use of some of the later forms of appliances.

10. Special attention was called to the deep overbite and abnormal occlusal plane in these cases, as being of as great significance in diagnosis and treatment as the distal relation of the lower jaw itself.

11. Finally, the necessity of extraction of upper bicuspids as a remedial measure except as a last resort was contraindicated both from the standpoint of occlusion and facial esthetics.

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DISCUSSION

The President.—You have heard this very interesting and clear presentation of an important subject, and it is now before you for discussion.

Dr. C. A. Hawley, Washington, D. C.—I think we have listened to a very admirable and complete exposition of the treatment of Class II cases. This excellent review of the diagnosis, prognosis, treatment, etc. and other phases of Class II cases presented at this meeting was stimulated by the paper presented by Dr. Case last year on the subject of retention, in fact was proposed and arranged before that meeting was over, and was intended to present the experience and findings of the Society as contrasted to those presented by Dr. Case.

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The point at issue between Dr. Case and this Society seems to center about the treatment of Classes II and III cases which show evidence of having been caused by heredity and of cases generally at or past maturity in which the facial lines might be improved by extraction of a number of teeth. As to the latter, there should be no great cause for disagreement. It is a matter of individual judgment in special cases and of individual judgment of the artistic requirements. About artistic requirements men will always differ, as many artists differ. Concerning the first division of Class II and the possibility of shifting the occlusion permanently in seemingly hereditary cases, I think the essayist has fairly represented the result of the experience of most of our members. The majority of apparently hereditary cases at a favorable age show no more difficulty in shifting the occlusion than any others. Also, considering the fact that it is impossible to definitely determine whether a case is or is not caused by heredity, it would seem the best course to attempt to establish normal occlusion first.

It is significant that in the replies to the letter sent out by Dr. Kemple last year in the preparation of his paper entitled "Orthodontic Limitations," that not one reference was made to failure in retaining the mesio-distal relation.

If Dr. Case only follows this method of extracting or opening spaces for extra teeth in a very few extreme cases, then there could be no great reason for disagreement, but he lays down principles which, if consistently followed, would lead to a much larger employment of this method. For example, in his book, page 184, he says: "While it is doubtless a fact that the lower jaw of a young patient can be more or less retruded in its relation to the upper with a properly adjusted headgear and chin-piece, a permanent movement in the opposite direction (that must of necessity be sustained by a decided structural osseous change of its joint articulation) has never been accomplished by the author, though repeatedly tried. Nor has he ever had the fortune to see any case from the hands of others that was permanently successful in that operation known as 'jumping the bite.' "

Again, page 317, "After repeated and long continued trials to 'jump the bite' with the most skillfully constructed apparatus for a number of patients younger than 13, all of which ultimately were failures, and moreover as he has never seen from the hands of others a well authenticated case of correction by this method, the author regrets to say, notwithstanding the operation has been recommended as practicable by a number of prominent orthodontists, he cannot advise anyone to undertake it."

These statements made in his book, which I have not seen corrected or modified, and the general tenor of the claims made in his paper, would naturally lead one to suppose that the success of shifting the occlusion in Class II cases was in grave doubt in his mind and not generally practiced.

The experience of the men in this society seems to be very definite on that question. They seem to be successful in shifting the occlusion even in many inherited and long acquired cases. In fact, the established method of the Angle school in treating such cases was based upon the discovery of the efficiency of intermaxillary elastics, or what Dr. Angle termed, the Baker anchorage. There is a great deal of sarcasm and ridicule in Dr. Case's written discussion which is entirely out of place in a scientific discussion and is not worthy of a reply. He charges the members of the Society with insincerity and misrepresentation. It is the first time to my knowledge that any member of this Society has descended to such tactics. It needs no reply but, having been published in the proceedings, should not be passed without comment.

Dr. V. E. Barnes, Cleveland, Ohio.—Dr. Pullen has done a great thing for the Society in submitting such a generous synopsis of his paper so long before this meeting. If we could have more of these synopses, we would have more intelligent discussions.

I am a little handicapped, however, in discussing his paper by not knowing or seeing the illustrations of the apparatus he wishes to use. Prior to discussing his paper, I had written and sent my discussion to Dr. Pullen, so that he might know what I was going to say from the outline of his synopsis. This plan of presenting synopses is one which we might do well to adopt so that the essayist may not be taken at a disadvantage when he has devoted so much time to a subject.

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The term distoclusion is not correct. There can be no distoclusion of all the mandibular teeth. Distal means away from the median line or center. The term should be posterior or posteroclusion, but we may with propriety use distoclusion in regard to the lateral halves of the arch or individual teeth.

To local treatment, add the relief of nerve irritation caused locally by pressure of teeth trying to erupt abnormally or erupting abnormally through abnormal tissues. This relief pressure should be applied away from the stress area in all directions.

To diagnosis add: underdevelopment of supporting structures does modify facial contours independent of as well as together with dental contours; therefore, facial contours must be considered with dental malpositions in diagnosis. Dental arches are malposed as well as teeth. The arches may be anterior, posterior, or lateral to, or above or below the horizontal plane of normal, and the face must be used also as a guide in judging.

The *scientific use* of a theoretically calculated coronal arch of the upper teeth will establish a minimum or basic arch which, being derived from measurements of the teeth in that arch, can be used as a measuring or judging outline in conjunction with malpositions of the teeth and malformations of the face. The *rational use of such an arch* will indicate the direction and the amount of tooth movement and will suggest to the student of physics the principles involved in the apparatus to be used in the corrective treatment.

To malformation of dental arches add malposition of arches.

To classification of arches add lack of vertical development, lack of anteroposterior development, lack of lateral development, and recall that we may have one or all or combinations of these three defective developments as well as overdevelopment of all these dimensions.

To protruding and retruding incisors, add inclinations of incisors and of all teeth. These inclinations will be anterior, posterior, mesial, distal, labial, lingual, and buccal. To habits add: habits produced generally only local effects which are superimposed on the greater underlying defects of bone development. I have casts of cases, many of them similar in appearance with the protruding and inclined incisors, some have been associated with sucking habits, others had no such history. The defects caused by habits are easily cured after breaking the habit, but the underlying defect usually will not yield so readily to treatment. We must think more of malposition of the teeth and malformation of bone and realize that malocclusion of teeth is but one of the resultants of prior defects.

To extraction add: extraction of teeth is not a method or means of correction, it is a compromise treatment of deformity after other methods have been considered, tried or found impossible of accomplishment. This extraction has been mentioned as a dernier resort. It is a last effort, a compromise, as I mentioned in the discussion of Dr. Dewey's paper in 1920 when he advocated extraction as a principle.

To treatment as a whole add the consideration of impactions, particularly that of third molars. The crowded or impactive formation and eruption of these teeth must be considered as a most likely probability in the posteroclusion cases, especially in the overbite classes. Large plate x-rays should be made of all cases from approximately eleven to fourteen years of age; these with the knowledge of the resistance met in treatment may indicate when extractions are indicated, but such extractions will be for that case alone. Other cases apparently similar, but with a history of easier yielding of bone, may not require any extraction. An orthodontic case is not finished until there is assurance that room for third molars is provided for or until they are eliminated as a pressure factor.

There is so much in this excellent paper which needs commendation that I feel lax in not passing comment, but time prevents. I most heartily commend that which I have not covered in the above discussion.

Impaction is a possibility almost a probability, particularly in this class of cases.

Dr. Horace L. Howe, Boston, Mass.—I wish to report a distoclusion case treated some twenty years ago. I have models of the case before treatment was instituted at that time and the models of the same case twenty years afterward. In this case the bite was thoroughly

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jumped forward. There was discussion about jumping the bite today. I cannot show this with the lantern, but I will be glad to show it to any member after the meeting.

Dr. Pullen's exposition of this subject is based on sound principles.

Dr. C. H. Juvet, Ottawa, Canada.—I would like to ask Dr. Pullen in regard to the last case he presented as to how long it is since he has seen that result, and what expectation there is for permanent retention in obtaining normal occlusion.

Dr. H. A. Pullen, Buffalo, New York (closing).—In reply to Dr. Juvet's question as to the elapsed time since the last case shown was seen and the chances for permanent retention I wish to say that I saw this young man about four weeks ago. He had graduated from college since I had seen him, a number of years having elapsed, and I was especially anxious to note the facial expression and the occlusion of the teeth, and I asked him to come to the office so as to get impressions of the mouth for comparison with original models. In observing the facial changes at this time I especially noticed the pleasing facial expression and I assure you I could not tell from external evidence but that the treatment in the way of shifting the occlusion had been perfect. Although I worked under great difficulties in trying to attain perfection of occlusal relations, I was absolutely sure from seeing him and getting some impressions, that the case was more satisfactory treated according to these methods without extraction of any teeth even if ideal occlusal relations had not been obtained. It is about four years since this case was retained, and the occlusion is apparently exactly as good as it was when retention was begun.

In referring in the paper to certain special phases of distoclusion, such as the influences of heredity and its recognition as an etiologic factor determining the treatment in this class of cases, especially in Class II, Division 1, Angle's classification, I would say that I had anticipated that our highly esteemed member, Dr. C. S. Case, would be here, and that we could freely discuss with him at greater length than it was discussed at Chicago, the special treatment of the complex cases of distoclusion and to contrast the shifting of the mesiodistal relations of occlusion and the attainment of normal occlusal relations with the extraction of certain upper teeth, such as the first bicuspids, retruding the six upper anterior teeth, and obtaining a less perfect result in occlusion and facial lines.

There is much that can be profitably said on both sides of the question and without Dr. Case being here to present his arguments for the extraction theory, I would not care to present further than outlined in the paper the arguments for the treatment without extraction in these difficult cases, nor to condemn in any wholesale way the extraction of upper first or second bicuspids and the retrusion of the upper anterior teeth in the cases of the first division of Class II (Angle).

If I were to append to my paper a short list of cases from my practice, in which extraction for these cases proved an occasional exception to the methods described in the paper of occlusal restoration without extraction, they would only detract from the comparative unity or uniformity of the rationale of the ideal treatment described of developing the dental arches to normal sizes, shapes and relations.

I heartily concur with Dr. Hawley in regard to the sincerity of the members of this Society in their impersonal and truthful presentation of complex cases such as are found in distoclusion, and no one could be more convinced of the necessity of seeking and telling the truth about these cases than are the individual members of this society, for only upon such truthful presentation of facts can the members of this society progress, individually or collectively.

I wish to correct the impression that I gave as to the credit for the use of loops upon the lingual arch as Dr. J. Lowe Young is, I believe, the originator of this technic and he should be properly accredited.

Dr. Young.—That is what I term a skeleton bite plate.

Dr. Pullen.—I should like to have illustrated my paper much more completely, but in order to do that, I would have had to lengthen the descriptive text accordingly in a paper already too long. As Dr. Hawley has pointed out, the paper is more of a review of our every-

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day work in our own offices most of which is well known to you. I did not wish to pronounce criticism on any appliance nor to favor the use of any one appliance more than any other. There comes in the matter of individual preference which must be respected, as well as the attainment of special skill in the use of even the older form of the expansion arch over the newer forms by men whose ability is unquestioned. I wish also to give due credit to those who have attained exceptional skill in the use of some of the newer appliances which have found favor with many of you, a few of which appliances were illustrated.

Dr. Barnes spoke of the terminology of the word distoclusion, saying that it was incorrect. In regard to this criticism, I will say that it is largely a matter of habit with us to use the term distoclusion and it has come into general use among orthodontists, just as the word "articulation" in dentistry came into popular use and for which authorities are trying with difficulty to substitute "antagonization." In orthodontic terminology then, will we any more readily substitute the word "posterocclusion" for distoclusion? We have formed this habit of using the word distoclusion, and I think that we will not be able to discard it very soon, especially as the word "posterocclusion" does not make as distinctive an appeal.

Arch predetermination of which Dr. Barnes spoke I believe in to a certain degree, although not carried to the extent he has illustrated in the citation of his cases, and to those of you who desire arch predetermination before beginning treatment, I would advise obtaining it by all means. Those students who use the method of arch predetermination before they begin work are less liable to make mistakes, but it must be remembered that you cannot predetermine the size of a permanent dental arch from a deciduous or mixed denture, which usually presents for early treatment of distoclusion.

Dr. Barnes described a very simple method of arch predetermination and I would advise the use of any simple efficient method rather than any complicated method of arch predetermination by means of complex surveys which require the services of a mechanical engineer to produce. Bodily growth cannot be surveyed, and it is the factor of growth and stimulation to growth with which we have to deal in orthodontia.

In regard to the description of the interesting case of jumping the bite which Dr. Howe has reported in his clinic, I would like to request, if possible, that Dr. Howe have photographs made of his case before and after treatment and published in connection with the discussion. It would be valuable to have these illustrations in connection with the history of the case in proving that the bite was jumped.

Dr. Juvet asked how long it is since the last case, which was shown in the picture, had been retained. In reply, I wish to say that I saw this young man at a social gathering in Buffalo four weeks ago. He had graduated from college since I had seen him, and I was especially anxious to note the facial expression and the occlusion of the teeth. I asked him to come to my office so as to get impressions of the mouth. In speaking to him at this time I especially noticed his facial expression, and I assure you I could not tell but that he really had perfect treatment in the way of shifting the occlusion. Although I worked under great difficulties in trying to attain it, I was absolutely sure from seeing him in the office after getting some impressions, that the case was fully satisfactory according to these methods. It is about four years since this case was retained and it looks exactly as good as it did four years ago when retention was begun. I thank you.

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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NEW GROWTHS OF THE ORAL CAVITY*

By Leroy M. S. Miner, M.D., D.M.D., Boston, Mass.

Cancer, used in its broadest sense, was the direct cause of more deaths in this country last year than occurred among the American troops in the recent war. The statistics are so appalling that every effort to reduce the ravages of this cruel disease should receive the heartiest support of every one interested in the public health.

The attention given this subject throughout the country during the recent cancer week served a very useful purpose in presenting to the public fundamental facts, freed from sensationalism, and also helped to arouse physicians and dentists to their full responsibility in properly attending to these cases.

Early diagnosis and treatment of malignant disease in any part of the body is of the greatest importance, for the earlier the condition is recognized, the greater the opportunity there is for successful treatment. This has been emphasized and reemphasized in our literature, and yet four cases within as many weeks have come to me where expectant treatment had been followed so long, that very little could be done for them.

These facts as they apply to malignant disease of the mouth, impose a great responsibility upon the dentist and upon the oral specialist. The dentist who is a keen observer, is in a position frequently to detect in the mouth early manifestations of malignant disease even before the patient complains of it. Hence, it becomes the duty of every dentist and everyone who treats diseases of the mouth, to be on the watch for its manifestations, and to seek aid when there is any doubt about the existing condition. This paper deals first with a survey of tumors, the oral cavity in general and second, with a discussion of one type in particular.

*Read before the Section of Oral Surgery of the First District Dental Society. Published by request of the essayist in the International Journal of Orthodontia, Oral Surgery and Radiography.

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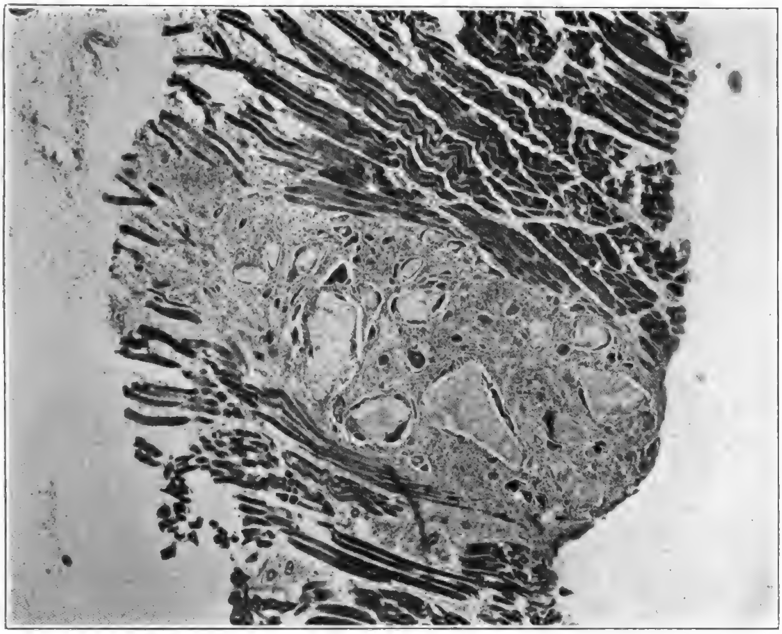

Fig. 1.—(x 35 diameters.) Lesion in muscle. Surrounding the lime salts is chronic inflammatory tissue and many foreign body giant cells.*

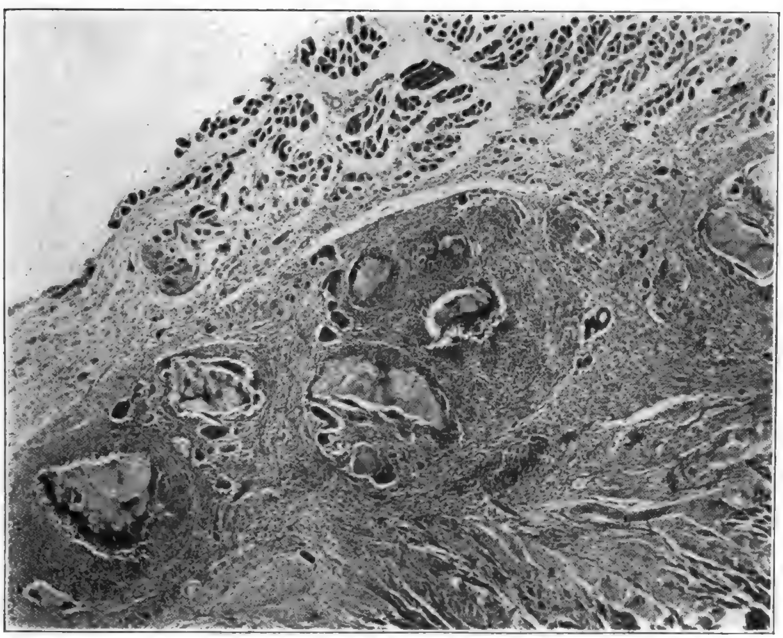

Fig. 2.—(x 35 diameters.) Another section of same lesion. Proliferation of fibroblasts is more pronounced.

*Figs. 1 to 5 are taken from experimental lesions obtained in guinea pigs by injection of tartar from mouth.

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CLASSIFICATION OF TUMORS

In classifying tumors the most scientific and yet at the same time, the simplest way is according to the type cell upon which the tumors are built, and from this type cell the tumor should be named. Mallory records some fifteen different distinct varieties of cells giving rise to tumors which may be denominated type cells. This method of classification recognizes that every simple tumor is due to the proliferation of one of these type cells and that the blood vessels and stroma furnished by the surrounding and included tissues are not of themselves an important part of the tumor. Proliferation of the fibroblast, no matter in what form, is called a fibroblastoma. The tumor clinically may be a benign fibroma, or it may be a malignant fibrosarcoma.

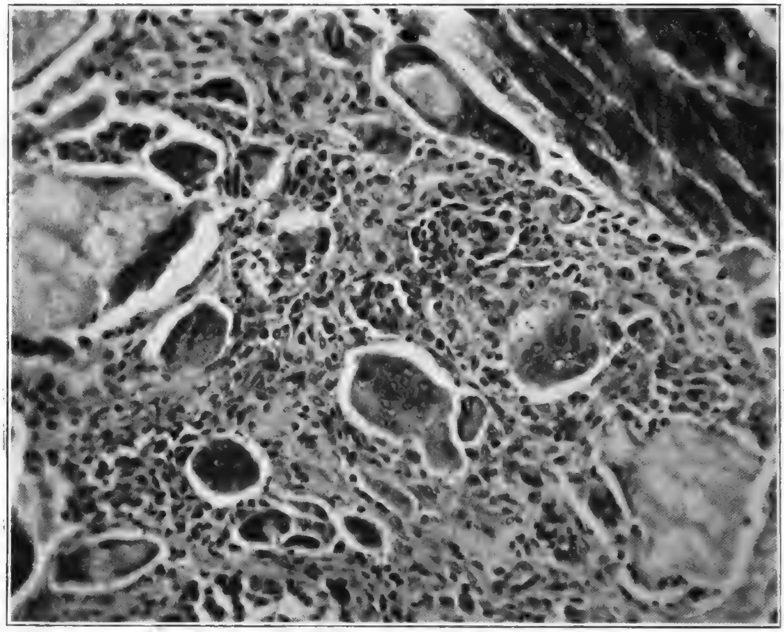

Fig. 3.—(x 275 diameters.) Chronic inflammatory tissue proliferation of fibroblasts and foreign body giant cells.

Of the various type cells, the ones most frequently giving rise to tumor formation are the fibroblast or connective tissue cell, and the epithelioblast or epithelial cell. Classification into benign and malignant tumors can never be gotten away from, and while it is impossible always to decide this definitely without a microscopic examination, the clinician finds this question staring him in the face in every case.

GENERAL CHARACTERISTICS OF TUMOR FORMATION

All tumors have certain common characteristics according to Mallory. Some of the important ones are:

First, Independence of Growth.—Normal cells are under control and the equilibrium between loss and replacement of tissue cells is maintained.

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This is not so in tumor cells, their growth is unlimited and uncontrolled except by a passive resistance of the invaded tissues.

Second, Vitality.—Tumor cells appear to possess more vitality than normal cells. They will grow and multiply while normal cells are atrophying.

Function.—Physiologically all tumor cells fulfil no useful purpose and generally are dangerous to their host. Quite the reverse is the case with normal cells.

Cause.—The cause of tumor formation generally is not known. Irritation has received much attention as a cause, but this fails to entirely satisfy scientific requirements.

Manner of Growth.—Tumors grow entirely by multiplication of their own cells, not by transformation of normal cells into tumor cells. This multipli-

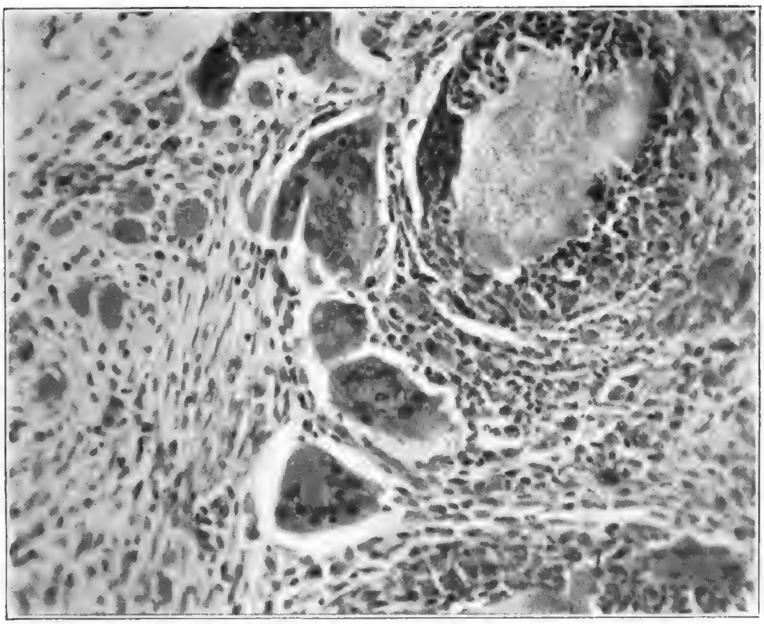

Fig. 4.—(x 275 diameters.) Acute inflammation (Poly-morphonucleated leucocytes) immediately surrounding the lime salts in addition to other cells in Fig. 4.

cation of tumor cells expresses itself in two ways either by expansion or by infiltration.

Recurrence.—When there is failure to remove all of a tumor, the remaining portion, if only a single cell, will continue to multiply until another tumor has formed. This is so generally recognized that no further comment is necessary. With these general facts regarding tumors in mind, I wish to discuss certain new growths appearing in the mouth. Tumors of epithelial origin form the largest and most important group of single tumors. This is the group we generally understand to be cancer. It is my experience that epithelioma is the most frequent true tumor to appear in the mouth. Early invasion of the glands of the neck in this condition constitutes a real menace to the patient. Even when an epithelioma is detected reasonably early and

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thoroughly removed, with complete healing of the original lesion, later metastases in the glands of the neck will sometimes appear even though they were not palpable at time of operation. It is a safe rule to follow, in cases of lesions in the mouth of doubtful diagnosis that do not promptly respond to simple treatment, to employ radical measures to remove the condition. To pursue expectant treatment in such cases from one to six months as is so frequently done, usually means the death of the patient.

Tumors of epithelial origin are usually primary in the mouth, but rarely metastatic lesions may appear. Hypernephroma—the most important new growth of the kidney gives rise to multiple metastases, and a metastatic lesion occasionally may appear in the mouth. Such cases have been reported

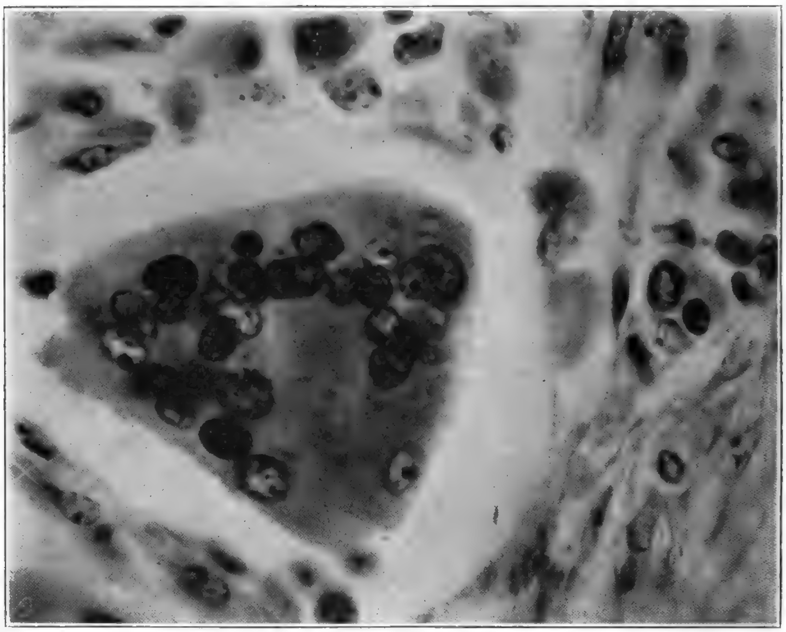

Fig. 5.—(x 1000 diameters.) Single foreign body giant cell from experimental lesion. Compare with Fig. 6.

and one came under my observation in July. The general appearance of the lesion was somewhat different from the ordinary epithelial tumor.

The term precancerous has been used to describe certain lesions not definitely malignant, but which later may become so. In the mouth leukoplakia is such a lesion. This is a proliferation of the epithelial cells of the squamous type tending to cornification. It is seen frequently in those who use tobacco, particularly those who chew. This lesion is absolutely benign in its beginning and may stay so for a long time. It does tend to break down into a carcinoma. I have had several cases where microscopically the beginning malignant growth could be demonstrated in the midst of the cornified epithelium of the leukoplakia.

Cancer of the mouth presents more hideous aspects than it does in some

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other parts of the body, and everyone who has to do at all with these cases cannot help but be impressed with the early radical surgical removal.

So far as the later cases are concerned necessitating complete resection of an upper or lower jaw, I have come to the conclusion that seldom does this operation serve any beneficent purpose, indeed if it does not cause added suffering. Statistics certainly do not encourage me to continue it as a routine procedure.

Proliferation of the fibroblast producing the connective tissue type of tumor is second to the epithelial group. The benign fibroma and the malignant fibrosarcoma arise from this cell. The proliferating osteoblast gives rise to the benign osteoma and the malignant osteosarcoma.

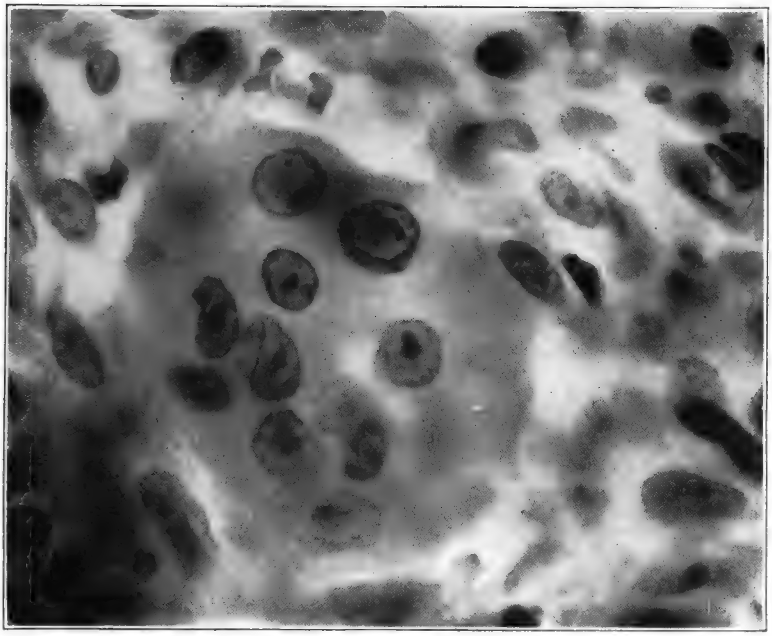

Fig. 6.—(x 1000 diameters.) Foreign body giant cell from lesion in mouth.

The chief point determining the question of benignancy or malignancy is the rate of growth of these tumors. Slow growing fibroblastomata we regard as benign, rapidly growing fibroblastomata we regard as malignant.

Perhaps the lesion we see most frequently in the mouth is the so-called epulis. The term is a clinical one and means no more than a growth on the gum. It is not descriptive of any pathologic condition itself. Epulis has meant to the surgeon a new growth bordering on malignancy, usually what we have known as a giant-cell sarcoma. To many dentists the term has meant any growth on the gum including not only the fibroma or the sarcoma, but the carcinoma as well. It is fair to say that the wide application of this term has resulted in a lack of definiteness always resulting in confusion. This is due to lack of careful attention to the pathology which is the basis not

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only for an adequate conception of these lesions, but for an intelligent treatment as well.

It has been a part of our inherited belief that a large percentage of epulides are giant-cell sarcoma. As a result of this idea, radical operations have been performed which have permanently disfigured the patient. Many teeth and large portions of the maxillae have been removed, and many times the wounds have healed in such a way that any sort of mechanical restoration of the parts to repair the mutilation has been practically impossible. If these statements are true (and I believe they are) no one can deny the importance of an exact knowledge of these lesions, which will better enable us to determine just how radical the treatment must be. If it can be shown

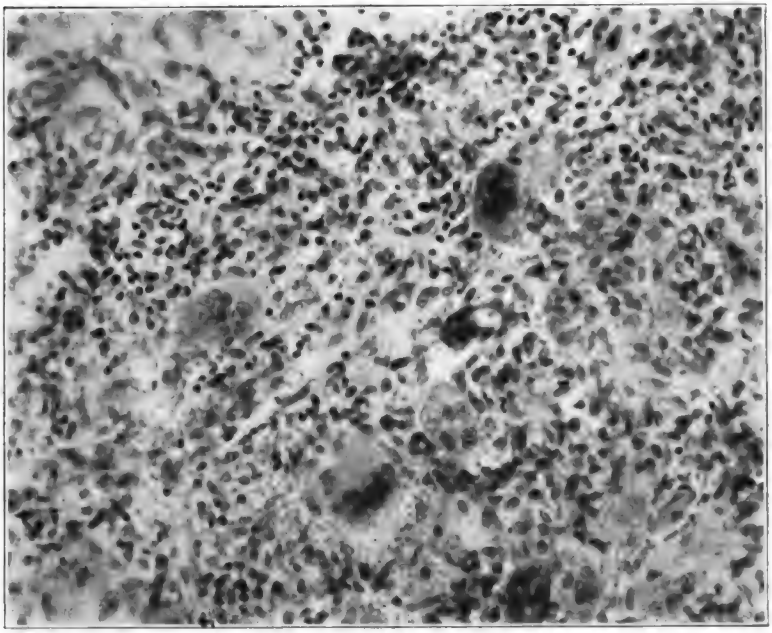

Fig. 7.—(x 275 diameters.) From a lesion removed from alveolar process of upper jaw. Giant cells—acute and chronic inflammation, but not true tumor. Compare with Figs. 3 and 4.

that the extensive sacrifice of tissue in treatment is unnecessary except in rare cases, many persons may be spared the disfigurement which has resulted so frequently in the past.

The gross appearance of these lesions has been described by various authors, and two clinical forms have been rather sharply differentiated. First, that form which is of the fibrous type, usually called fibroma, which is described as a small growth, firm and smooth, and without projections; the mucous membrane of normal appearance, and comparatively nonvascular. Second, the giant-cell epulis usually called giant-cell sarcoma, which is described as having a deeper red color than the fibrous type; a softer consistency; a greater vascularity, with more tendency to bleeding; a greater size, and a more rapid growth. Both types are rather sharply defined. From a clinical standpoint, these descriptions are sufficiently accurate to indicate

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in a general way the gross appearance of the lesions which we see most commonly. From a pathological standpoint however, these types cannot be so definitely and sharply differentiated. Furthermore, the study of over fifty cases upon which I have personally operated and followed up, and studied microscopically, leads me to believe that the pathology does not correspond in a large percentage of the cases, to the generally accepted idea that these lesions must be either fibromata or giant-cell sarcomata. These lesions of the alveolar process, both fibrous and giant-cell type, arise from the same kind of cell, namely, the fibroblast which is the ordinary connective tissue cell. The fibroblast appears as a flat cell with an oval nucleus. It produces "two kinds of fibrils: fibroglia and collagen fibrilis, the latter forming an intracellular substance." I have already said that a tumor of slow growth arising from this cell is called a fibroma. When the growth is rapid

Fig. 8.

it is known as a fibrosarcoma, the rate of growth determining whether the tumor is benign or malignant. When we consider how great the variation in rate of growth may be, it can easily be seen how impossible it is to make a sharp distinction histologically between the two types under consideration. They are fundamentally the same, springing from the same sort of cell. Both are fibroblastomata. The fact that giant cells are present is of little or no importance, as I shall show later.

The type of lesion which was described first, and spoken of as the fibrous form, may be made of bundles of slowly proliferating fibroblasts, and when so made up can be correctly called a fibroma. Histologically, however, I have found that only a very small percentage of cases (four out of forty-three) of this type, not showing giant cells, are true fibromata. A large majority of the lesions prove to be chronic inflammatory tissue, granulation and scar tissue, superimposed upon which, frequently is found acute inflam-

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Fig. 9.—Section from lesion shown in photograph. Acute and chronic inflammation with proliferation of fibroblasts.

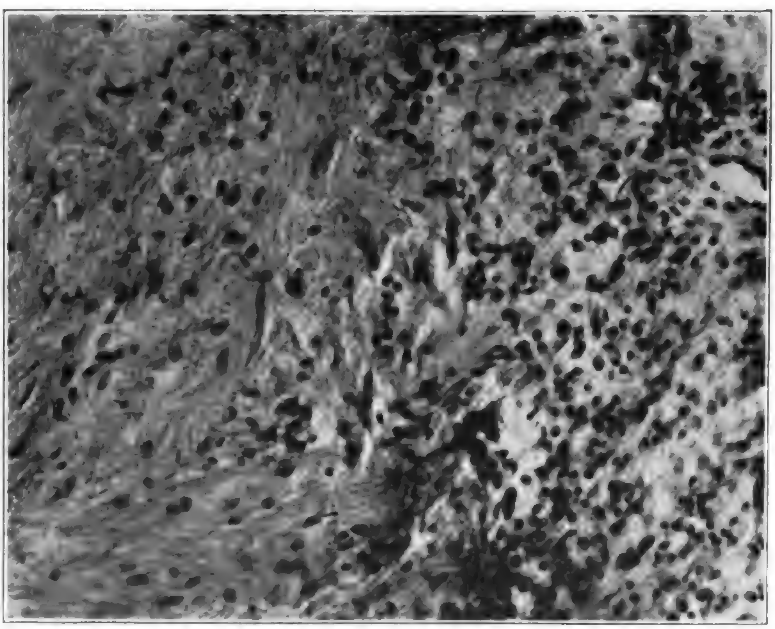

Fig. 10.—(x 275 diameters.) Same lesion. Lymphocytes (chronic inflammation) and proliferation of fibroblasts.

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mation as well. From a study of these cases, microscopically as well as clinically, I believe that most of these lesions are caused by some irritation which produces a reactive process, in the form of chronic inflammation. This reaction to an irritant, in whatever form it may be, results not only in the gathering of the lymphocytes, which is so characteristic of chronic inflammation, but also what is more important, a hyperplasia of the fibroblasts, with the resulting formation of new connective tissue. This increase and growth of the connective tissue is not in any sense a true tumor formation, however, even though clinically it may have that appearance. It can easily be seen in cases where the hyperplasia of the connective tissue is marked, how it

Fig. 11.

could be regarded as a fibroma, for just where the dividing line is between the two is sometimes impossible to say. Furthermore, we get mitotic figures in inflammatory tissue as well as in tumor formation, so that this feature cannot be used as an aid in differentiation. In forty-three cases studied, in which no giant-cells were present, two were almost pure granulation tissue, with some acute inflammation superficially. Four other cases showed granulation tissue present in considerable amount, together with acute chronic inflammation. Four cases as has been noted, could fairly be called true fibroma. In two of these four cases the connective tissue was very dense. Two other cases were osteofibromata, and showed a slight amount of bone formation. In all the rest of the cases chronic inflammation tissue pre-

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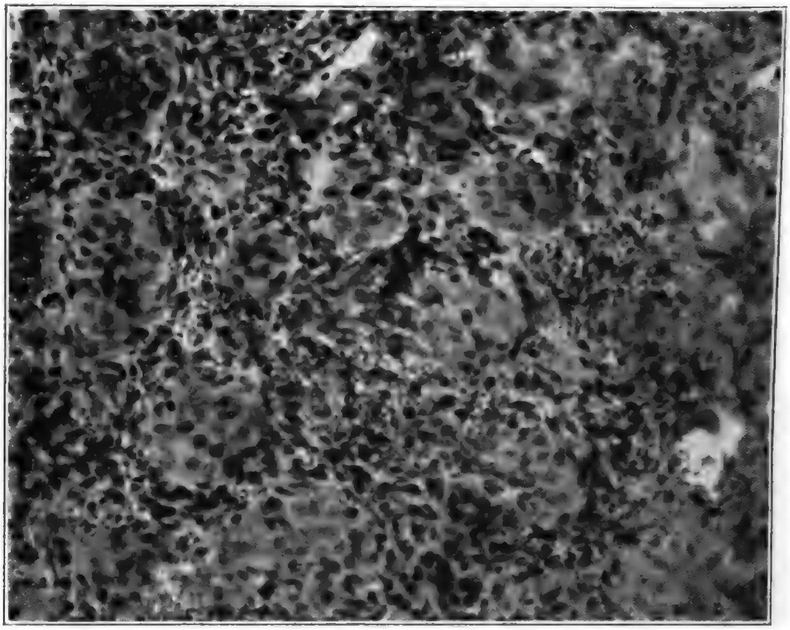

Fig. 12.—(x 35 diameters.) From case illustrated. Almost pure granulation tissue. Clinical diagnosis of giant cell sarcoma had been made.

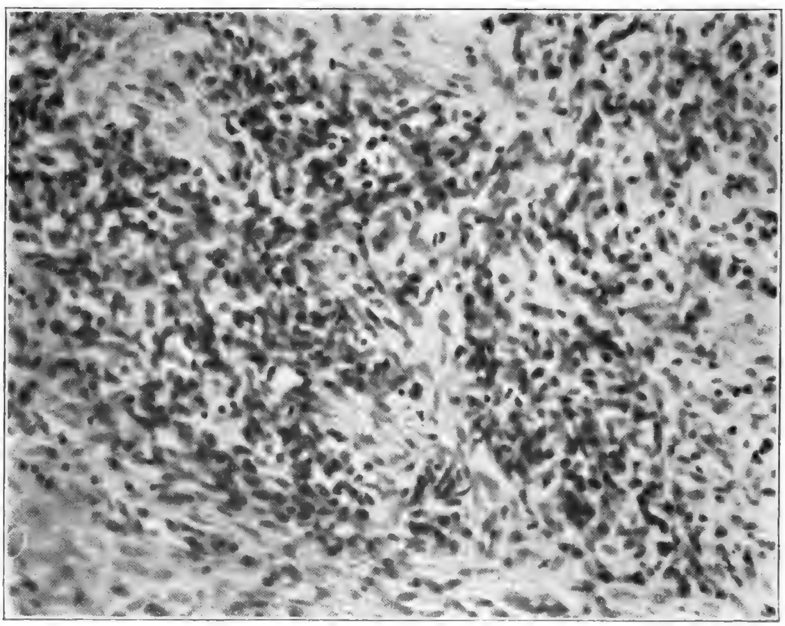

Fig. 13.—(x 275 diameters.) Chronic inflammation with some fibrous tissue. Clinical diagnosis had been fibroma.

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dominated, with usually some acute inflammation at the periphery. In many of the cases, the clinical appearances corresponded very well with either one or the other of the types already described, yet pathologically they were nothing more than inflammatory lesions.

Of the type showing giant-cells and usually called giant-cell sarcoma, the type which is said to be the most common, I found out of the fifty-three cases, but ten. In discussing the pathology of this lesion, first let us not lose sight of the fact mentioned early in the paper, that it arises from the fibroblast. This connective tissue element is the important part of the growth. As I shall soon show, the giant-cells, while they present a striking microscopical picture, are nevertheless of secondary importance. It has been shown (Giant-cell Sarcoma, F. B. Mallory, M.D., "Journal of Medical Re-

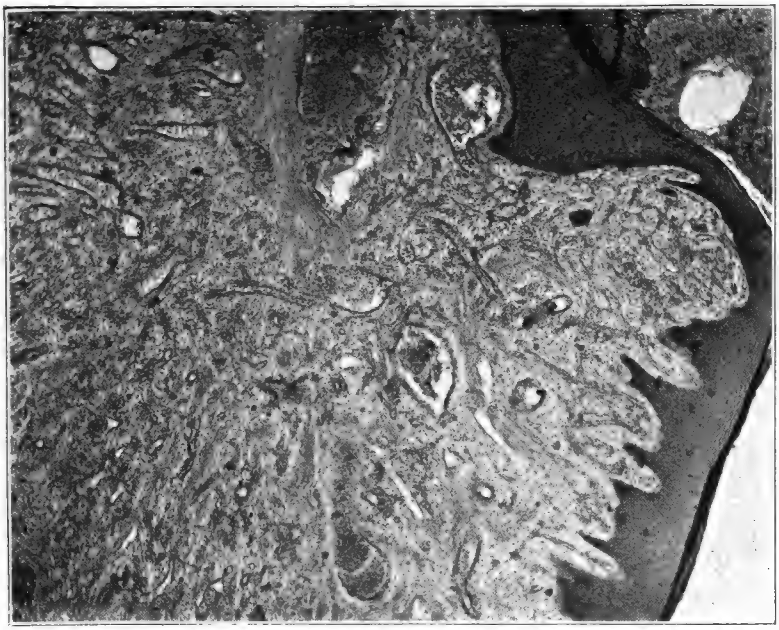

Fig. 14.—True fibrosarcoma with many foreign body giant cells. Practically no inflammatory cells. Giant cells of no significance in diagnosis.

search," Vol. XXIV, No. 2) that two types of giant-cell which arises from multiple mitosis, and which is a true tumor cell. Second, the foreign body giant-cell which is formed by the fusion of endothelial leucocytes, and which is not a tumor cell at all. In all the cases studied, it was the foreign body giant-cell that was present, the tumor giant-cell not appearing in a single instance.

The foreign body giant-cell is a large irreguar-shaped cell, the cytoplasm of which is well defined. It has many nuclei, which stain deeply, and which are also sharply defined. These cells are formed as has been said, by the fusion of endothelial leucocytes, and are found not only in tumors, but appear in inflammatory tissue as well. When they appear in true tumors, they are of no consequence, as has been said, so far as the tumor formation

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is concerned. The endothelial leucocyte, which is a large mononuclear cell in the blood, is attracted into all sorts of lesions, by various substances, chiefly fat and lime salts, which may act as irritants. As they gather in numbers, they tend to fuse around the substance which has attracted them, provided it is difficult of solution, and form these foreign body giant-cells.

With this idea as a starting point, I performed some experiments to see whether or not the irritation from the calcareous deposits of the teeth could produce these phenomena. Ordinary tartar was finely powdered, and a heavy suspension, one and a half c.c. was injected into the shoulders of several guinea pigs. In the first experiment the tartar was not sterilized, but was injected with ordinary sterile precautions. Several pigs died, and most of them developed well-marked abscesses more or less localized. In the second series, the tartar was carefuly sterilized with dry heat for an hour before making the suspension, and the injections were made with sterile precautions. The results will best be demonstrated by the plates, which show how almost identical, microscopically, these experimental lesions are, with one of those found in the mouth.

The pathology seems to be briefly, this.—First, the injury to the tissues causes an acute reaction which brings polynuclear leucocytes to the region. Then the irritation of the foreign body (in these experiments the tartar) results in attracting many endothelial leucocytes, some of which fuse and form foreign body giant-cells. In addition to this, the fibroblasts begin to proliferate and form new connective tissue. The whole picture as it appears under the microscope, looks strikingly like what has hitherto been regarded as giant-cell sarcoma.

That pathologists have been wrong in regarding these giant-cells as usually indicating tumor formation, has been shown by Mallory. It is probably true that diagnoses of giant-cell sarcoma have been made, which were nothing more than an accumulation of foreign body giant-cells and some proliferated connective tissue.

Of ten cases studied with a clinical diagnosis of giant-cell sarcoma, six were not true tumors. These cases, aside from the giant-cells, showed granulation tissue and chronic inflammation. Three cases could fairly be called fibrosarcomata. The remaining case was also probably a true fibrosarcoma, but it was extremely difficult to decide with positive assurance.

In the face of these facts, and with the knowledge that these lesions, even when they are rapidly growing fibro-sarcomata, do not form metastatic growths elsewhere, and in spite of what I have said earlier about the necessity of radical attention to new growth formation, it semes to me we are not justified in radical operative procedure, which removes large portions of the jaws adjacent to these growths, as is not infrequently done. Moreover, it is our duty to our patients to give them a chance, especially where a radical removal is going to disfigure the patient. It has been my experience that a thorough removal of the growth itself, and a thorough curetting at the base of the lesion which involves the periosteum, using a surgical burr where it is necessary, is quite sufficient. In none of the cases that I have operated on

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in this way has there been any return of the lesion so far as I know. In some cases it is advisable to remove a tooth or teeth, in order to get more thoroughly at the base of the lesion, but removal of large sections of bone or the bone itself is not necessary as a rule. Of course cases should be kept under observation, and, in the event of any return, more radical treatment may be given. The recurrence of a lesion does not necessarily indicate malignancy, however.

We know that fibroma does recur when it has not been completely removed.

It goes without saying, that in addition to this treatment, the removal of anything that may be acting as an irritant is necessary. In three or four of my cases the edge of a gold crown running too far down under the gum at one point seemed to be a possible etiologic factor. Two cases presented amalgam fillings jammed down into the interproximal space.

In conclusion, the importance of early diagnosis and treatment of lesions of the oral cavity cannot be overemphasized, but conservative treatment of certain types of tumors is warranted from our knowledge of their pathology.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By

Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

RADIODONTIA AS A PROFESSIONAL SPECIALTY

By Rodrigues Ottolengui, New York City

TEXT

DR. CLARENCE O. SIMPSON writes me as follows: "I should like an aggressive paper from you on the establishment of radiodontia as a professional specialty, instead of a commercial enterprise or an office girl's bluff. I know you have decided views on the subject, and I need your assistance in the propaganda. Any topic which you feel needs airing will be welcome, and I shall appreciate your cooperation."

ARGUMENT

The above special invitation is contained in a letter which announces that the writer, Dr. Simpson, is to have charge of the "radiography department" in the *International Journal of Orthodontia, Oral Surgery and Radiography*, and I accept with pleasure. But I should have had some hesitation had the new editor's wishes been couched in other language. For example, had he requested from me a paper on the value of the skiagraph in dentistry with an adequate description of the technic required for the production of a good radiograph, together with some views as to the value of a diagnosis resting solely upon the radiogram, I should have felt inclined frankly to state to Dr. Simpson that in my view radiodontia has no proper place in Roentgenology. But radiography and radiodontia are words with which I am in full accord.

Some may account me a carping critic, or even something worse. My own father once told me that I found no interest in a photograph unless I had taken it myself. Some of my dental friends similarly may declare that I dislike all new words unless I coin them myself. There is just a bare modicum of truth in this, since I have coined but few, and these have been meant to serve a good and useful purpose, which they have done, as we shall see in a moment.

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The new editor courteously tells me that if there is any topic which I think needs airing it will be welcomed. At the very outset, then, let me pay my respects to the comparatively new word "radiogram." I cannot better treat this subject than by quoting from a letter written to the Chairman of a Committee on Terminology appointed in Boston by Dr. Otto King, as Chairman of the Dental Editor's Club. Among the words recommended in the first report from this Committee was this word "radiogram." My comments on it follow, and I should be happy to see a general discussion in this department.

"First, however, let me say that if a word adequately conveys a thought, it really serves its prime purpose. In coining words to express new ideas, it is preferable, of course, to follow the general rules that cover such work, rather than to produce one of the awful hybrids so often seen in the commercial world.

"Where a perfectly well constructed word already exists and is in common use, the vary natural question arises, 'Why coin a new word?'

"The word to which I desire to take exception is the word radiogram.

"I am of course aware of the fact that this word already appears in the Standard Dictionary to mean a 'radiographic negative, or a print from it.' This by the way is a very loosely constructed definition, as a radiographic negative (sic?) is not a negative; and moreover it is unfortunate that one word should mean both the negative and the positive; but the same work also gives radiograph as a synonym of radiogram. But I would more particularly call your attention to the fact that radiogram is also said to mean a radiotelegram. The question then arises: What would be the best method of using these words so as to confine or limit their meaning? I cheerfully admit that following strict rule we should use the Greek verb for the English verb, thus to radiograph, a verb. And that we should use the Greek participle for the noun, thus a radiogram.

"But this rule, in connection with this particular Greek verb has not been stringently followed. I allude of course to 'grapho.'

"The Standard gives us 'gram a suffix, added to Greek nouns, or English words to indicate something written' as ideogram, pantagram, cablegram.

"'Graph' is given as a suffix denoting that which writes or that which is written, this latter a plain admission that graph may by used in coining nouns. Indeed the word 'graph' itself is an English noun. Hence it has not been held obligatory to restrict 'graph' to verbs, and 'gram' to nouns.

"Let me cite just a few words for you to think over.

Autograph, verb and noun.
Autobiography, noun. Not autobiogram.
Biograph, verb and noun.
Dictograph, noun.

"And there are many others. But there is one to which I particularly call your attention.

"We have monograph, meaning to make a special descriptive writing on one thing or group of things. This is the verb. Monograph the noun,

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means the result of this monographing. Then we have the word monogram, derived from the same roots, meaning something totally dissociated from monograph. And this leads us back to our subject.

"We have the verb telegraph, and the noun telegram. We have the verb photograph, and the noun photograph. Therefore, by analogy, why not restrict radiograph to the process which is a part of photography, and radiogram to the message which results from telegraphy?"

For the above reasons it is apparent that I prefer the word "radiograph," to "skiagraph," "radiogram," or "Roentgenogram." In regard to his last term I am quite in accord with the desire of the Roentgen Society to honor Roentgen, but it seems to me a poor compliment to honor a man of science by coining a word which is in discord with the rules long ago established by a much older body of scientists. The Department of Philology of the Brooklyn Institute of Arts and Scientists, in accord with similar bodies, has long held that no new word should be coined from two diametrically different languages (such as Greek and German in this instance) and also that it should be considered bad taste to coin a word out of a proper name. Had the Roentgen Society suggested that we abandon the somewhat stupid term, the "x-ray" and call it the "Roentgen ray" that would have been eminently proper, more especially as Roentgen did discover the x-ray, but so far as the writer knows did nothing whatever towards the establishment of modern radiography.

If radiography is to become a distinctive branch of science, as it must, and if radiodontia is to take its place as an honored specialty in radiography, it does seem to me that we might well begin by adopting a distinctive terminology, at the same time dropping certain terms in common use which if they indicate anything, express the writer's ignorance rather than the depth of his knowledge. Dr. Edmund Kells, one of our pioneer radiodontists long ago took exception, and rightly, to the phrase "lingual view." Yet these words have been given to us by commercial men, the manufacturers of radiographic film mounts, and really not by the radiographers themselves.

A word that irks me quite as much as any other misnomer in radiography or dentistry, is the word "shadow." It would be bad enough if writers who use this word made it apply to the records on the film caused by objects which resist the ray. But it is exactly the other way about. Because an opaque body, interposed between the sun (or other light) and a luminous surface, darkens that surface with the outline of its own form, thus producing what we call a "shadow," men have come to speak of the dark spots or areas on radiographic films, as "shadows" whereas in reality they are exactly the opposite. The dark spot on the ground indicates that an opaque body has stopped the ray of light; whereas a dark spot on a film indicates that a more or less translucent area has permitted the x-ray to pass more freely.

A medical writer dealing with the subject of oral infections in relation to systemic disease interpolates and interprets many radiographs. Not only does he speak of the "shadows" at the apices of teeth, interpreting them to indicate dental abscess (he uses abscess and granuloma as though they were

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synonymous terms) but later on he graciously presents us with a verb, describing films in which "several teeth are shadowed."

In the early days of the art, it was common for writers to speak of these areas as "rarified areas," as though a film could be rarified. It was perhaps my earliest appeal for a more standardized method of interpreting radiographs, so that some sort of dependable diagnosis might be made to rest upon the evidence which they might contain, which inspired me to propose the terms "radiopaque" and "radiolucent," as words that register on the mind a physical condition of the tissues through which the ray had been passed, without declaring the area to be healthy or diseased. These words I am pleased to say have met with approval, and have been universally adopted. Moreover they have served the purpose for which they were introduced, since they compel the radiographer, the dentist or the physician to take into account the clinical symptoms and conditions which may have caused the "radiolucency" or the "radiopacity" recorded in the film.

I do not refer to these terms in a self-congratulatory spirit. They were bound to come into the language since they were needed and exactly express thoughts which previously had no words to fit them. The point I wish to make is that the adoption of this exact language has contributed towards a more exact interpretation of films; from which I deduce that radiography or if you please radiodontia will more rapidly become a true science when we adopt, comprehend, and use an exact terminology. Moreover (to return to my special *bête noire*) we should use terms that carry their meaning to men of collateral sciences. Any educated man would understand "radiolucent" and "radiopaque" at first sight. But let us imagine Mr. Thomas Edison's being told that a "radiogram" of his mouth disclosed the fact that he had an abscessed tooth. Could you blame him were he to ask, "Who sent you that wireless?"

I fear I am making this rather long, but Dr. Simpson did not tell me when to stop. However, it perhaps will be as well to close this with a brief prophecy. He asks my opinion as to whether radiodontia is destined to become a scientific specialty. I believe that it will, and when it does it will in a large measure be due to conscientious efforts of men like Dr. Simpson.

Time was when radiography was chiefly used for examination of the radiopaque objects, such as diagnostic wires, or faulty gutta percha fillings. It required little science either in taking or in reading the radiograph to decide that the wire passed an inch or more beyond the root apex, or that a gutta percha was half an inch or more short of accomplishing the purpose for which it was introduced.

But with the announcement of the granuloma (another word that we will abandon some day) as a camping ground for the streptococci prior to their advance upon one or another of the important organs of the body; and when physicians began to turn to the radiograph which they scrutinize from the "lingual aspect," with little or no study of the buccal aspect or the coronal conditions; and when commercial radiographers began the wholesaling of radiographs with arrows indicating the "shadows" at the apices,

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and the wise old doctors "followed the arrows," and ruthlessly ordered the extraction of teeth, radiodontia came into existence, because a great calamity had fallen upon our people, the burden of which it shall become the lot of the scientific radiodontist to lift.

And so, my dear Doctor Simpson, I welcome you into the association of dental editors; I will cooperate with you in your chosen work and I wish you Godspeed.

PLACING AND HOLDING FILMS IN THE MOUTH

(Part 1: General Considerations. Part 2: Technic by Regions.)

By Howard R. Raper, D.D.S., Indianapolis, Ind.

Part I

(*Continued from the May issue.*)

TECHNIC

We have arrived now at the point where we are ready to consider the correct technic of placing and holding films in the mouth. The technic may be divided into the following steps: (1) Bending the film. (2) Placing the film in the holder. (3) Placing the film and the filmholder in the mouth. (4) Having the patient bite.

Fig. 8.—Film held in the maxillary premolar (and molar) region with the thumb. This is a satisfactory method of holding the film, but holding with a universal filmholder is more satisfactory. (It is probably easier to hold the film in the maxillary premolar region than in any other part of the mouth.)

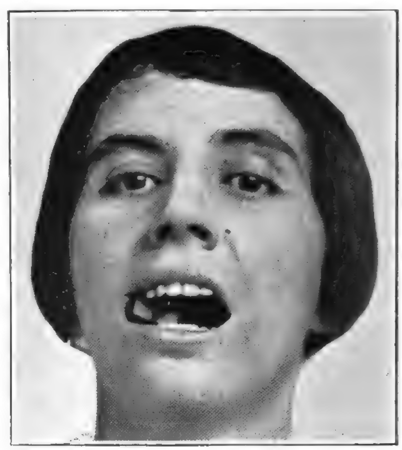

Fig. 9.—Film held in the maxillary premolar (and molar) region with a universal filmholder.

BENDING THE FILM

The art of bending the film packet is, I sometimes think, the most important thing about placing and holding the film in the mouth. The fundamental

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principle of bending the film packet is this: *to deliberately bend a part of the film in order that the remainder of the surface of the film may be kept as flat as possible.* Thus, we deliberately spoil a part of the negative (by bending it and so distorting or blurring the radiographic image) in order that the entire negative may not be distorted or blurred. (See Fig. 10.)

All film packets may be bent. The Buck film packet cannot be bent as abruptly as others. Light is let into the packet if the Buck packet is bent too sharply. The new Eastman packet ("translucent base" films) require the least bending because they are so flexible.

I usually stand in front of the patient as the film is being bent. In this position it is easy to figure out just which parts of the film packet are to be bent, depending on the particular region where the film is about to be

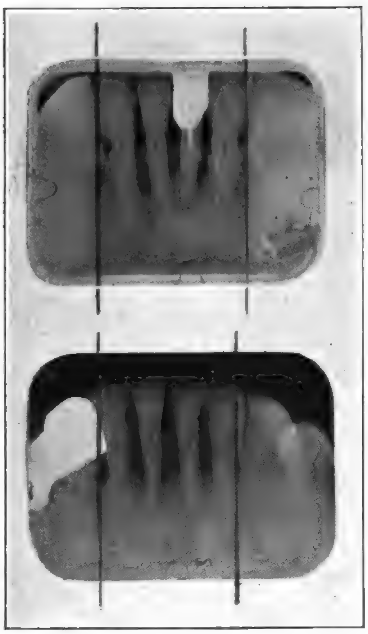

Fig. 10.—The sides of the film for these negatives were bent back abruptly to avoid bending the whole surface of the film. Outward from the vertical lines the radiographic image is blurred and distorted due to bending of the film, but the radiographic image between the vertical lines is not distorted because this portion of the film was kept tolerably flat. (These films were placed "crosswise." The writer prefers to place the film "lengthwise" for the mandibular incisor region.)

placed. Also the psychic effect on patients is good. They see that the film is being bent to conform to the mouth and so give the operator credit for trying to prepare the packet so that sharp corners will not hurt the mouth. As I bend the film I sometimes warn the patient that if the packet "feels sharp" in the mouth *it cannot cut.* Patients sometimes move during exposure because they think the film packet is actually cutting the mouth; that is the way it feels to them and they think the operator has made an error and placed the film incorrectly.

While it is this writer's practice to always bend film packets—slightly or much depending on location in the mouth—before placing them in the mouth,

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I am aware that this is simply a personal preference. Dr. Simpson bends the film packet against the teeth, in three movements, *as he is putting the packet to place.* Other men may prefer to adapt the film to the tissues with the finger as illustrated in Fig. 23. Still others may pay no particular attention to bending the film packet at all; they may simply place the film packet in the filmholder and put it into the mouth, letting the shape of the mouth take care of the bending. While this latter practice yields good results *part* of the time, it is not to be recommended; it often causes unnecessary discomfort to the patient and excessive bending of the entire film surface.

PLACING FILM IN HOLDER

The placing of the film in the holder is very simple; the packet is simply placed in the slot and the screws tightened to hold it immovable. I stand in front of the patient usually while doing this, planning just how the film packet and holder are to be placed in the mouth. Always put the film packet in the slot so the nonsensitive side of the packet presents toward the rubber back support. After the packet is placed in the holder, it may be bent again, or, if the operator wishes, all of the bending may be done after the film packet is fastened in the film holder.

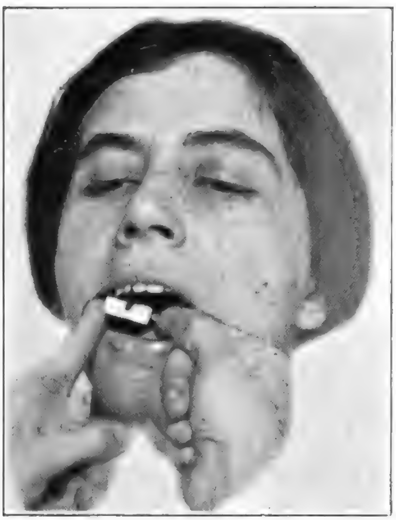

Fig. 11.—Putting the films and filmholder in place in the mouth. Maxillary premolar region. The lingual end of the holder is supported by the forefinger against the screw in the illustration. It would be better if the fingers were placed just below the screw against the end of the holder. The filmholders in Figs. 11 and 12 are retouched white to make them show plainer in the mouth.

Fig. 12.—Showing that the patient may bite down on the filmholder without biting the operator's fingers. The thickness of the holder holds the teeth apart. Removable handles may be used in connection with filmholders, but the writer prefers to use his fingers to carry the holder and film packet to place.

PLACING FILM AND HOLDER IN MOUTH

Fig. 11 shows the film and filmholder being carried to place for the maxillary premolar region.

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When the film is to be placed in the posterior maxillary region, carry the film as far back as desired, then move it buccally into place, placing the bite plane of the holder on the occlusal surface of the teeth. Do not put the bite plane against the occlusal surfaces of the teeth first and then push the film and holder distally. This would cause the film packet to rub over the tissues as it was moved distally, which would be unpleasant and might cause gagging.

When placing the film packet for the mandibular teeth, slide the packet between the teeth and the tongue. The packet sometimes inadvertently "rides" on a "muscle attachment." When this occurs, have the patient "wiggle the tongue" or remove and replace the film, or let the film packet slant under the tongue a little away from the teeth. (This latter necessitates an x-ray angle somewhat farther below the horizontal.)

When placing the film packet in the anterior region of the mouth (maxillary or mandibular), the operator's forefinger may sometimes be used to assist in getting the film to its correct position. (See Figs. 26 and 30.)

HAVING THE PATIENT "BITE"

When the film packet and holder have been carried to place, the patient is instructed to "bite." The thickness of the holder keeps the patient from biting the operator's fingers (Fig. 12). When the patient bites firmly on the bite plane of the holder, the film packet is held firmly in position (Fig. 9). Figs. 30 and 31 illustrate a special detail in technic in having the patient bite when the film is being placed for the maxillary incisors.

As illustrated in Fig. 7, the holders are beveled to prevent tipping. The bevel, however, will not prevent tipping if the film holder is not correctly located on the film packet. Tipping is most likely to occur when the film is being placed for the upper posterior teeth. If, when the patient "bites," the holder does tip, remove, loosen the screw and change the location of the holder on the packet. (It is usually necessary to move the holder anteriorly.)

Anesthesia calcidin, an anesthetic, antiemetic, antigagging tablet, made by the Abbott Laboratories may sometimes be used to advantage. The tablets are easy to use; simply have the patient allow the tablet to dissolve on the tongue.

(*To be continued in July*)

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Filtered, but Not Safe

Q.—Is there danger in operating an x-ray machine without a filter? Through fear I have had one put on, but am not getting as good results as before.

A.—The use of a filter as a protective agent in radiography is like carrying a buckeye to ward off rheumatism, the successful results conform to the law of averages and no one boasts of the cases in which the precaution was

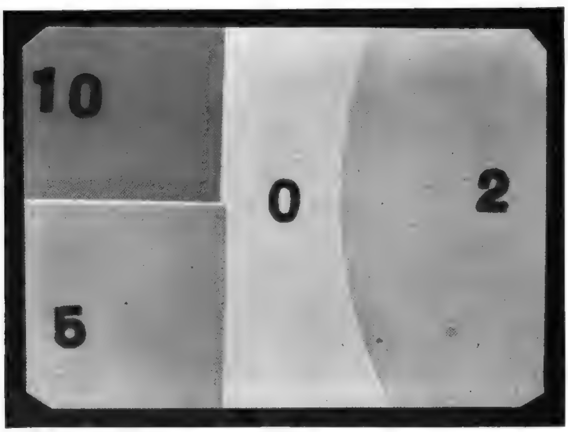

Fig. 1.—The result of a short exposure of medium penetration to aluminum 2/10 mm., 5/10 mm., and 1 mm. in thickness. The area of the film marked 0 received the unfiltered radiation.

deficient. Filters are imperative in radiotherapy, but their value in radiography is greatly overestimated. If you follow a rational technic, a filter is not needed for protection and as a means of improving radiography its utility has not been proved. To be specific, when operating at a target-film distance of not less than 12 inches, with a penetration of not less than a 4-inch back-up, a filter is a negligible safety factor.

The filtration of x-rays is the absorption or obstruction of the soft rays of lesser penetration. Substances are effective for this purpose in relation to the atomic weight and density, and aluminum, copper, leather, and bakelite are favorite materials. Atmosphere acts as practical filter, hence increasing the distance of the x-ray tube from the patient reduces the danger of

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dermatitis. If x-rays were transmitted like light instead of being absorbed by the air, distance would not limit their action and it would be necessary to confine radiation to metallic rooms.

The proportion of soft rays decreases as the voltage is raised, but they are not eliminated by extremely high voltage. This feature of the problem recalls the dilemma of the Arkansas traveler famed in song and story, who could not repair his roof when it was raining, and when the rain stopped he did not need the roof. If the proper technic is used, a filter is not needed for safety, and when a low voltage is used, a filter worthy of the name is prohibited by the lack of penetration. With a 4½-inch spark gap, the exposure required for any intraoral radiogram needs no filtration for safety other than reasonable distance, and the interposing of filter media *will not protect against excessively prolonged or repeated exposure.* With care, radiodontia may be safely practiced without a filter, and conversely injury will result from excessive exposure even though a filter is used. If you are considering self-defense instead of the patient's protection, the use of a filter might be a flimsy plea in a damage suit, but if all the facts were revealed

Fig. 2.—A radiogram made with a 3½ inch back-up and half of the cone covered with a 1 mm. aluminum filter. The effect of filtration is marked because of the large proportion of soft rays in a comparatively low penetration.

Fig. 3.—The result of filtering half the field with 1 mm. of aluminum and using a 4½ inch spark gap. The effect of the filter is less pronounced than in Fig. 2 because the proportion of soft rays was less. No improvement in definition from filtration is evident in either test.

it would not vindicate ignorance or carelessness. You may have defense, protection, and a tranquil conscience by adopting correct methods with adequate equipment properly installed, and rigidly limiting radiation to a safe amount. In the latter precaution you should inquire about any recent exposure to which patients may have been subjected, for in this period of incompetent, and unrestricted radiography, the public has less protection than wild game, and the last operator will be held responsible.

The action of filters in altering the character of oral radiography is a debatable question, which among other research problems will be submitted to the American Society of Dental Radiographers for solution. Theoretically it would appear that a filter might improve the definition in negatives, but in varied tests the evidence is unconvincing and probably there is no advantage gained over distance and diaphragming. The secondary rays produced by the glass walls of the tube impair detail more than any primary radiation, and this can be satisfactorily controlled with diaphragm and cone.

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The greater actinic or chemical action of soft rays on photographic emulsion increases the contrast when they are employed in combination with hard rays, so filtration is a disadvantage if it does not enhance definition.

The effect of the aluminum filters ordinarily used in radiography is not so great as might be supposed. The accompanying illustration shows the result of a short exposure of medium penetration to aluminum of different thicknesses in contact with the film packet. The two intraoral films show the effect of covering half of the larger end of the cone with 1 mm. of aluminum. The contrast in the two sections is less as the penetration is increased, and there is no evident improvement in the detail of the filtered position under either condition. Doubtless if the target-film distance was less and neither

Fig. 4.—Extraoral radiogram with half of the cone covered by 1 mm. of aluminum. No apparent effect is produced by the filter, as explained in the text.

diaphragm nor cone used, the filter would prove more advantageous, but such conditions are unnecessary and the experiment would have no practical value. In the extraoral radiogram reproduced, 1 mm. of aluminum covered half of the cone, but the increased distance from filter to film and secondary radiation from the tissues obliterated the line of demarcation and leaves no apparent difference in the sections. Until proof is offered that radiodontic examinations can be improved by the use of filters, you should depend upon other safety factors rather than lengthen your exposures to compensate for a filter of sufficient thickness to be a protection.

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Otherwise They Are Perfect

Q.—Are the new translucent base films a great advantage? There are so many things advertized one does not know what is best, and I have enough trouble without trying all of them.

A.—The disadvantages of the translucent base of films in flexible packages far overbalance the advantages. The translucent base is intended to diffuse brilliant transillumination without interposing a separate diffusing medium such as ground glass or celluloid. If one viewed films toward the sun or the filament of a clear electric bulb this would be of service, but since other methods of illumination are commonly used it is superfluous.

The translucent base presents the same objection as translucent celluloid mounts, it obscures the definition and contrast in negatives and is easily marred by confusing abrasions. Since the diffusing surface is in the same focal plane as the image, the eye detects and is distracted by the grain which is unavoidable in the mechanical preparation of the surface. This fault is emphasized when a reading glass or a viewing device giving magnification is used. Moderate diffusion adds artistic charm to photography, but Coolidge tubes have already produced too much "soft focus" effect in radiography without introducing a diffusing base to the recording medium. The emulsion surface of films requires some protection against scratches which may be misleading in interpretation, and since the translucent surface is easily marred, both sides of these films should be protected.

When negatives are closely inspected for study, a reflected light or the soft light through opal glass will be found best suited for the purpose, and the translucent celluloid mounts have long been discarded by discriminating observers. The translucent base is retrogressive and more objectionable than the translucent mounts because the films could be removed from the mounts for observation. The translucent base films are especially unsatisfactory for viewing when wet, and complaint has been made that they curl excessively in dry climates. The nonemulsion side of ordinary films after drying, presents spots from dust and uneven evaporation. These and any chemical sediment retained by the etched surface of the translucent base cannot be readily removed, and further impair the visibility. A sales argument is made on the ease with which the flexible packets may be opened, but the dark room assistant states that they do not open as described in the seductive literature, and she greatly prefers to handle the regular style with crimped edges.

It is suggested that these films should be viewed from the emulsion side to permit the diffusing medium to act upon the light before passing through the emulsion. This method of viewing presents the labial and buccal aspects which reverses the conditions established by exposure. Radiodontic negatives are generally and correctly viewed from the nonemulsion side except in Chicago where many men seem unable to adapt themselves to any viewpoint but that of facing the patient for a Bosworth sales spiel. The statement is often heard that the impression is the same when the film is viewed from either side. It is not true because the emulsion is toward the lingual surfaces of the teeth during exposure, plane negatives are not devoid of linear

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perspective, and the nearer that objects are to the film the sharper and denser they appear. Therefore to correctly perceive conditions in viewing the emulsion surface, one must mentally reverse the structures or imagine they are being viewed in a mirror.

The flexible packets may appeal to operators who prefer painless methods to superior results. Photographic emulsion should present a flat surface to accurately record the image, and intraoral films should not be bent more than necessary to bring them near the tissues. The flexible packages bend more than necessary for adaptation and bulge into small edentulous spaces. For the mandibular structures, a fairly rigid packet is desirable to depress the sublingual tissues; the flexible packets are less efficient for this purpose than the former product of the same manufacturer, which meet all requirements and are satisfactory in all respects except for the obtrusive printing on the staining orange paper which must annoy those who serve them without dressing. Pain from placement of films is usually due to careless or clumsy manipulation and "rag" packets are indicated only in acute inflammatory conditions and for children who often compel a sacrifice of technical standards.

Products of this character will continue to appear and be discarded, while manufacturers through commercial rapacity endeavor to throttle competition by forcing useless innovations upon the profession, instead of investigating and more efficiently supplying the necessities. An amusing example of things made to sell instead of use, is a device for placing in register two duplicate films worthless from underexposure or underdevelopment, so the image can be seen. No doubt this was designed to increase the exposure latitude in materializing "spirit" negatives produced by impotent units, and to delight the "single barrel" sloths who conserve ammunition with senile frugality. Conceive of a "dumb-bell" at the inane occupation of adding ciphers by matching two anemic films in a "safety razor" to stimulate his imagination, instead of making a thorough x-ray examination.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Nitrous Oxid-oxygen Anesthesia for Dentistry and its Standardized Induction. J. A. Heidbrink (Minneapolis). Current Research in Anesthesia and Analgesia, January, 1922. Bulletin No. 18.

Induction is described as follows: this stage should be sufficiently slow to allow time for the gas to be distributed throughout the circulation. When pure nitrous oxide is administered to the normal adult the anesthesia may seem to be sufficient after fifty seconds but this interval is too brief to permit the distribution in the blood. Symptoms of deficient induction are shown in succession by undue and unnecessary excitment produced perhaps by the sense of suffocation; exaggeration of symptoms before or contemporary with anesthetic effects; rapid development and overlapping of symptoms; difficulty of arresting the momentum of the anesthesia; evidences of too deep anesthesia with supervention of undesirable symptoms making it necessary to interrupt the use of the gas; instability of the anesthetic effect so that it cannot be held even. All of these phenomena are due to rapid induction and in order to dampen the effects of the gas and secure slow induction oxygen must be given with the nitrous oxide. In order to secure an optimum the author after repeated tests now makes the proportions of the gases as follows: nitrous oxide, 93; oxygen, 7. His former ratio was 95 to 5, and the change is not due to any basic rearrangement but to the discovery of a defect in measurements. The duration of the induction period is a full minute and after this interval the pure nitrous oxide is substituted for the mixture. With this induction all of the untoward incidents of too rapid induction with pure nitrous oxide are either absent or reduced to a minimum.

The "New Doctrine" of Oral (Dental) Sepsis. Editorial in the Medical Record, January 24, 1922.

Doctor Kornfeld, a Viennese dentist who recently addressed the Vienna Medical Society on this subject makes it plain that dental focal infection has largely been ignored on the continent. Any one familiar with the medical literature of Europe knows that oral sepsis is practically limited to acute and

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fulminant or subacute septicemia originating somewhere in the mouth. The European clinicians have done a great amount of work in acute focal infection and in the type of subacute infection attributable to the *streptococcus viridans*. But under chronic obscure affections which are not a menace to life and which produce principally nonpurulent affections that closely simulate rheumatism, neuralgia and other chronic painful and incapacitating affections, we find nothing in transatlantic periodicals which answers to our own huge and unwieldy literature. This omission cannot in any way be attributable to want of keenness on the part of the foreign clinical observer. Either such affections do not exist then at all, and we have been obsessed with the importance of one factor to the neglect of the other possible causes, or, our widely practiced conservative dentistry as contrasted with the greater amount of extraction in the Old World may itself have created a new disease type; while on the other hand physical therapeutics are much further advanced and in far more common use there than here. Let us suppose that an individual develops a rheumatoid condition which is at once treated with hot air or diathermy, hydrotherapy, massage, galvanism, etc., without any special attempt to locate the cause. He may obtain relief and when his ailment returns he resorts again to the same treatment. With us after a few ill-directed attempts at relief, his teeth may be accused and after proper dental treatment he may or may not improve. In a large percentage of cases there are other factors beside the teeth which may contribute to maintain his infirmities.

Our doctrine of dental focal infection, and of chronic focal infection in general, is but a few years old, and since 1914 Austria has been cut off entirely from American literature. In 1920 appeared a work known as the "Atlas of Life," published in English, and from this source Dr. Kornfeld learned for the first time of the wholesale propaganda regarding dental focal infection in this country. He seems to have been much surprised and impressed. The genuineness of the teaching seems to have been vouched for by Osler representing the physicians and the Mayos as representative surgeons. Dr. Kornfield's article appeared originally in a Vienna medical journal which the editor has consulted in the original. It does not appear that Kornfeld adduced much of his individual experience and the physicians who discussed the paper rather scouted the theory of chronic dental infection. One of them said that in twenty-five years' practice he had seen exactly one case which corresponded to the American conception of this affection; he concluded that on account of its great infrequency it could not be regarded as a public menace. Another physician made sport of the "Atlas of Life," quoting the Latin proverb, "I fear the man who has read one book."

Death from Spontaneous Shedding of a Temporary Tooth in a Hemophilic.
Thèsée (Brest). La Revue de Stomatologie, January, 1922, xxiv, 1.

The patient in this singular case was a boy aged ten years, who was taken to the author's office in a vehicle, very weak and of a waxy pallor. A few evenings before, the child had removed with his own fingers one of the second lower molars which had become loose from total absorption of the roots.

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From this moment the tissues around the adjacent permanent bicuspid had begun to bleed steadily, although not at an alarming rate. Medical advice was not sought for the bleeding, but for the pallor of the skin and mucosae, a syncopal tendency and frequent vomiting. The family physician applied compression and injections of hemostyl, with two temporary arrests of hemorrhage, one of five and the other of seventeen hours. When the hemorrhage reappeared the second time the patient was taken to the author's office. The history showed that the maternal grandmother had had hemorrhages following each childbirth. Father, mother, four sisters and a brother were all normal in this respect, but another brother who had died of meningitis at the age of ten years had shown a decided hemophilic tendency. The patient himself had presented the same tendency, bleeding readily when injured, and requiring much pains to secure hemostasis. This hemophilic tendency was not continuous, for there were certain periods only when simple trauma caused almost incoercible bleeding. The patient was taken to the hospital where gelatinized serum was twice injected and local hemostasis practiced without benefit. Soon after the exhibition *per os* of a large dose of ergotine, death took place. In twenty-one years of dental practice the author had never seen a case of dental hemorrhage which did not yield to hemostatic measures. In so-called "bleeders" he had always used preliminary doses of calcium chloride, two to four grams as required, in divided doses before extraction, etc.; and this precaution had always proved adequate for this class of patients. In another case he would seek to inject a 5 per cent solution of peptone subcutaneously after hemorrhage had set in. Hemostyl is of use in prevention, given over a period of several weeks, to improve the coagulability of the blood.

Novocain Dermatitis. J. V. Klauder (Philadelphia). The Dental Cosmos, March, 1922, lxiv, 3.

The author seeks to explain the nature of this annoying affection, as follows: From the work of Feurst, Schulty, Stein, Weidenfeld and others in which the reaction of the skin was studied under normal and abnormal conditions to various strengths of irritating substances, it appears that the normal response or susceptibility of the skin to common irritants of variable nature is that degree of reaction to which the majority of individuals will respond. A few will react in a lessened and others in a more severe manner. Hypersusceptibility may be general or limited to one or more irritants. Idiosyncrasy is hypersusceptibility of an extreme character, in which there is no proportion between the degree of irritation and the response. Normal susceptibility after repeated irritation may become of the degree of idiosyncrasy. This suggests a summation of irritation. This summation is seen in experiments on muscle. Apparently the skin is still under the influence of the first stimulation when the second is experienced. The logical conclusion in practice is to alternate the use of different analgesics somewhat as surgeons are sometimes forced to do in working with antiseptics. When some uncertainty exists as to the exact irritant the cutireaction may be practiced with the suspected substance. The subject, according to the author, is not to be confused with

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protein sensitization and the use of skin tests to detect the source of food poisonings. Nevertheless systematic writers on the nonspecific protein reaction point out that these substances or antigens are not necessarily of protein nature but may include substances of any kind.

Facial Swellings: Their Etiology, Diagnosis and Treatment. L. Harris (New) York). The Dental Cosmos. March, 1922, lxiv, 3.

This subject seems to have been relegated almost wholly to the dental profession—that is, inflammatory swellings. The doctor who now and then does an emergency extraction holds aloof from these swellings and is glad to pass them along to the dentist, and without delay. Both the medical man and laity are inclined to blame the teeth in all such swellings and while this is usually found to be the case it is important for the dentist to know other conditions which can stimulate these odontogenous swellings. The teeth may not be directly involved in certain lesions of the maxillae and the author cites an interesting case of syphilitic periostitis in which there was marked facial swelling, cervical adenopathy and trismus. The teeth were perfect and at first the condition was so obscure that a diagnosis of tetanus was thought of. After serodiagnosis of syphilis the condition promptly subsided under salvarsan. In this case the x-ray examination had naturally been negative. In another case of acute facial swelling suggesting alveolar abscess, the x-ray and dental examination was negative (the electric pulp test had shown that every tooth was alive), and the final diagnosis was cellulitis of unknown traumatic origin; perhaps an infected insect-bite or scratch from shaving. Acute cervical adenitis is sometimes of obscure origin and neither the teeth, tonsils, nor any other tissue drained by these lymphatics is found diseased. In such cases a tooth suspected of causing the condition may be extracted without benefit. When the swelling is of odontogenous origin the latter may be readily overlooked and the author cites the case of a minute granuloma left behind after a premolar extraction. It was necessary after the correct x-ray diagnosis to expose the socket and curette the granuloma away.

The Epithelial Rests (or So-called Glands) of Serres. J. Howard Mummery (London). The Dental Cosmos, March, 1922, lxiv, 3.

This article is one of a series of studies in dental histology. In concluding, the author does not suppose that anyone since the time of Serres has ever assumed that these bodies are actually glands. They have been variously regarded as abortive enamel germs, as gingival glands so-called, as mucous corpuscles, as epithelial debris in the periodontal membrane, and the same in the tooth band. It is evident that they are identical with the epithelial coils or *globes epidermiques* found in the mucous membrane immediately beneath the surface epithelium, derived from the remains of this tooth band and also from buds contributed by the Malpighian layer of the gingival epithelium. This identity is shown by the opening of the coils on the epithelial surface, by the presence of the spiral body in the center, by the extrusion of the spiral body from the coils and finally by the fact that sections taken through the white

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bodies with the brown centers distinctly reveal that these and the coils are identical. With regard to their functions we have no certain evidence, but there seems good reason to conclude that they serve, by their rarefaction and expansion in the gum tissue, to open up a path for the eruption of the deciduous teeth, much as a similar function is claimed by Malassez for the epithelial strands in the gubernaculum in the process of the eruption of the permanent teeth. The term "glands of Serres" is, of course, misleading and the author prefers "epithelial rests of Serres," which will serve to distinguish these formations from the "rests of Malassez" in the periodontal membrane.

The Dentist's Responsibility During the Period of Gestation. A. H. Nobbs (San Francisco). The Pacific Dental Gazette, February, 1922, xxx, 2.

It is actually within the power of the dentists to lower both the maternal and fetal mortality of childbirth by proper attention to the teeth during pregnancy. The infantile mortality for the first year of life is about 87 per 1000 births. Nearly one half die within the first month. In California the death rate is 70 per 1000, and in the city of San Francisco but 63. These figures, relatively low, are far higher than those of New Zealand with 48.2 per 1000. The majority of deaths during the first month are due to maternal conditions. About 33,000 women die annually from the act of maternity. Of conditions which menace the mother focal infection may first be mentioned. Obstetricians throughout the country have begun to take this question seriously and to give antenatal attention to sinuses, tonsils, teeth, etc. Certain affections of the mouth and teeth are prone to appear during gestation and demand skilled treatment. Here belong caries, loosening of the teeth, salivation, gingivitis, etc., the causes of which in this connection are still obscure. There should be no fear of treating the teeth at this time and the danger of abortion is less from the intervention than from the condition for which intervention is practiced. Cavities should be filled as usual, and extractions performed if indicated, under gas-oxygen. A history of habitual or excessive abortion might possibly contraindicate extraction. No attempt should be made to give the mother calcium salts, for it is much better to allow her a quart of cow's milk daily. Milk of magnesia however, is useful, as it may antagonize the development of acidosis which is believed to threaten in pregnancy.

Local Anesthesia in Dental, Oral and Nose and Throat Surgery, with Particular Reference to Nerve-Blocking. H. E. Tompkins (New York). New York Medical Journal, Feb. 1, 1922, cxv, 3.

Injection at the tuberosity should reach and anesthetize the posterior superior dental nerve and its distribution, and the resulting anesthesia may include the three molar teeth and the second bicuspid but frequently the latter is not included and in some cases even the first molar is not wholly anesthetized. The alveolar process and buccal mucosa corresponding to the teeth are included in the anesthesia. Injection at the posterior palatine foramen should reach and anesthetize the anterior palatine nerve as it emerges from the posterior

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palatine foramen. The palatine area should be anesthetized as far forward as the first bicuspid. Injection at the infraorbital foramen should reach and anesthetize the anterior dental nerve. The anterior teeth with the alveolar process and mucosa should be anesthetized. In this species of anesthesia 15 minutes may be required to render the region insensitive, while by the other routes not over five minutes are required and injection at the posterior palatine foramen may require but three minutes. In about 75 per cent of cases of injection into the infraorbital foramen not only the anterior dental nerve but the parts supplied by the posterior-superior and middle dental nerves will be anesthetized. The author advises the combination of the infraorbital and interior palatine foramen injections. The exact details of technic for each anesthesia, the solutions used, the anomalous behavior seen at times, and the accidents which may occur are not adapted to a short abstract and should be read in the original. The author mentions that insensitiveness of the mucosa in all of the localities is sufficient evidence of the success of the injections.

A Case of Actinomycosis. C. K. Bryant (Philadelphia) The Dental Cosmos, February, 1922, lxiv, 2.

Miss Bryant's article is actually the laboratory report of the case but the clinical history is of interest from the diagnostic angle. The patient was a farm hand, aged sixty, although only for a few years past and then at harvest time. He had had abscesses in both upper and lower jaws for which extraction of molars had given relief. The last had been within the year when the left lower third molar had been removed. This had been succeeded by pain and stiffness in the left temporomaxillary articulation, which caused the patient to become interned in the University Hospital. Here the x-ray proved negative and the Wassermann, including the provocative test, likewise negative. Tuberculosis was excluded on general principles. The only condition appreciable was chronic pyorrhea alveolaris which was treated in the usual manner, while an ineffective attempt was made to wedge the partially ankylosed jaws apart. There now appeared intercurrently a hardness in the left parotid and temporal regions with increasing tumefaction and a diagnosis was made, tentatively, of sarcoma. An exploratory incision exposing those regions revealed only a chronic inflammatory process. This operation involved resection of the zygoma. Three weeks later the wound edges, still unhealed, broke down, and a serous fluid containing some yellow granules came away. Actinomycosis was at once suspected but the laboratory report was negative. A fortnight later a small nodule appeared over the left parotid region and was incised. The ray fungus was now in evidence but in the interest of a possible added or special infection an elaborate study was made. The so-called symbiosis of a streptothrix with a bacterium could be excluded and likewise apparently the ordinary streptothrix bovis. The organism was most closely allied to the paractinomycosis of Colebrook, but at last accounts its identity has not been completely settled.

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EDITORIALS

Are the Criticisms of the Dental Welfare Foundation Just or Unjust?

THERE has probably been no movement in the dental profession which has caused so much criticism from various sources as has the action of the National Dental Association in recognizing the Dental Welfare Foundation.

A great amount of this criticism has come from men not familiar with the purpose of the Dental Welfare Foundation, or the manner in which it received recognition from the National Dental Association. There has never been any action of the National Dental Association and the Board of Trustees that has been so misinterpreted and about which so much misinformation has been given out.

The statement has been made that the Dental Welfare Foundation was

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"railroaded" through the National Dental Association and was brought up as an order of business at the last meeting of the Board of Trustees and the House of Delegates, and consequently did not receive the proper consideration. As a matter of record, no business that came before the House of Delegates or the Board of Trustees received as much deliberation as did the plan of the Dental Welfare Foundation. This was because men who were interested in the Foundation realized their acts would be open to criticism, and consequently desired to give every one a chance to express an opinion on this matter before it was finally passed.

On three different occasions, the proposition was brought before the Board of Trustees for consideration and each time it received only favorable comment, although two members of the Board did not speak in favor of it, yet when it was voted on they did not vote against it. These two members were given ample opportunity to raise objections to the plan but no objections were raised. It was passed unanimously by the Board of Trustees and therefore, was passed on to the House of Delegates, where it again received unanimous endorsement.

It therefore seems to us rather improper that the Board of Trustees and the House of Delegates, should now be criticized by the men who were not interested enough in the welfare of dentistry to attend the national meeting at Milwaukee. Those who had objections and were interested in the National Dental Association should have attended the meeting and raised their objections at that time.

In the face of the criticisms raised, we should consider whether the purpose of the organizers of the Dental Welfare Foundation is such as to enlist support or condemnation. The plan of the Foundation as outlined before the Board of Trustees and the House of Delegates was to provide a means of distributing dental information among the public, in such a manner as to avoid any criticism relative to unethical conduct by the dental profession.

The dental profession had at various times considered the distribution of dental information, but any plan that was seemingly backed by a few of the dental profession, would be misinterpreted by the public. The public would consider the dentists were working for their own advancement rather than with a motive for the benefit of the public from an educational standpoint.

A number of members of the dental profession have always agreed that they would be willing to contribute a little money to some fund which would have for its object the enlightenment of the public on dental needs. Consequently the Dental Welfare Foundation proposed a plan that seemed to solve the problem more satisfactorily than anything that had ever been suggested.

After this plan had been adopted by the Board of Trustees and the House of Delegates of the National Dental Association, the criticisms began to come in. Let us consider the nature of the criticism and what it amounted to, and then we shall be better able to decide the justness of it.

One of the first criticisms was that the Foundation was organized by dental supply men for the purpose of furthering their own interests. This

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is a criticism which at the present time has very little justification, judging the action of the men most interested in the organization of the Dental Welfare Foundation. The action of the majority of the officers of the Foundation before and since its organization has been only such as would tend to show they were working for the benefit of the public and not for their own private interests. A few isolated cases have been brought to our attention where small dental dealers have attempted to use the Foundation as a means of stimulating business among dentists and some have even attempted to use it as a means of selling goods to dental students. In all cases where this has been brought to the notice of the Dental Welfare Foundation, the privileges offered have been denied these dealers and they have been refused the authority to receive subscriptions from dentists to the Dental Welfare Foundation.

These acts of the officers of the Dental Welfare Foundation suggest that the officers at least are working for the education of the public, and if their plan is abused by a few dental dealers, it is no worse than what the dental profession is confronted with when their code of ethics is abused by a few advertising dentists. We are sure no one would condemn the entire Dental profession for the unethical acts of a few dentists, so why should the entire Dental Welfare Foundation be condemned because of the acts of a few unwise dealers?

Another criticism is that "the public does not need more dentistry but better dentistry." We find this argument coming from a class of men who practice in communities or among a clientele that had been accustomed to appreciate dental services. Probably some of the most adverse criticisms have come from men who have select practices. A man with a well-established clientele among a more refined people can afford to say that his patients want better dentistry and not more dentistry, but this man is only viewing the dental situation from the confines of his practice, and has no opportunity to come in contact with the large number of people who need dental education and more dentistry, before they will be prepared to receive better dentistry.

The need of education is impressed upon us because we can view the situation from two sides, namely, from a private practice and an East-side dental clinic. The people we see in private practice are of the class that would not be reached by the work of the Dental Welfare Foundation. They belong to the group that need better dentistry. Of the patients we see in the clinic, the majority belong to the group that need dental education. This is proved by the fact that day after day we see little patients brought into the clinic, six and seven years of age, with the first permanent molars hopelessly decayed. The mother makes the statement that she thought it was a deciduous tooth. When informed that the first molar is a permanent tooth, she is willing to go to any means or do anything necessary to save the tooth, but the tooth is beyond saving, all because she did not have the proper education on dental subjects.

It is this large group that the Dental Welfare Foundation will reach, and it is this group alone that would justify any effort made by the National

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Dental Association, the Dental Welfare Foundation or by the individual dentist, to get information to them and save these little patients the decay of the first permanent molars. Better dentistry will do them no good because what the large middle class needs is education to avoid the decay of these teeth, and if they get this education, experience has proved they will make even greater sacrifices than the upper classes in order that these teeth may be taken care of to avoid the suffering and pain that comes to a youngster from a decayed and aching first permanent molar.

We believe the criticism of the Dental Welfare Foundation is unjust and has been made by men because they do not appreciate the general dental situation so well as did the organizers of the Foundation. If the education which the Dental Welfare Foundation is sending out succeeds in saving but a few hundred first permanent molars, the effort will be worth while, and the movement will be one which should receive greater support next year than it has this year. To those men who are criticizing this movement, we would suggest a more careful consideration of the Foundation, and that they be less anxious to criticize until they can suggest a more feasible plan that will be of more service to the large middle class that needs education.

The Necessity of Standardizing Terms in Radiography

FOR a number of years the dental literature has contained different terms which were supposed to have the same meaning. Certain terms have also been used to describe definite conditions, and very often they have been used incorrectly. During the last year our attention has been called to the fact that radiography is one branch of dentistry which has an overabundance of terms, making it desirable that an attempt be made to standardize them in order to avoid confusion in the literature.

We find standardization is not as easy as might be imagined, because some of these radiographic terms have been suggested by certain authors and for certain reasons, and these men still insist upon using the word which they sponsored. With the formation of the American Society of Dental Radiographers considerable difficulty was encountered in selecting a name to satisfy the members. A number of very long, complicated, and supposedly scientific names were suggested, but finally after some discussion and after the committee had practically decided on another name, "The American Society of Dental Radiographers" was adopted.

The adoption of this name for the Society did not satisfy every one, nevertheless, upon close analysis it seems to be more satisfactory than anything that has been suggested up to the present time.

Dr. Anthony who was Chairman of the Nomenclature Committee of the Dental Editors Club gave a report at Milwaukee which contained a number of terms that were of interest to Radiography. For example, he stated that "radiograph" should be used as a verb, "radiogram" to be used as a noun. These two terms to a certain extent settled some of the confusion which has

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arisen and which has existed in the profession because certain writers have used the term "radiograph" and "radiogram" as synonyms, transposing them until the average individual did not know which was the noun and which was the verb. The word '"radiographer" is used to describe one who makes radiograms and has also been criticized by some writers, however it seems to be about as satisfactory and as near good form as any word suggested.

The terms "roentgenogram," "roentgenograph," and "roentgenographer" should be dropped because they have no scientific meaning and are words which have come into use because of an attempt to immortalize the discovery of the process known as x-ray.

We find another group of terms which have considerable usage, and those are "radiodontia," "radiodontic," and "radiodontist." "Radiodontia" is supposed to be that science which has for its object the making of "radiodontic records" (radiograms of the teeth). We suppose this word was coined to be in keeping with "orthodontia," "exodontia," and "prosthodontia," all of which seem to have attained a certain importance in the dental profession and all of which are more or less incorrect. Orthodontia will probably exist as a term in this country because it has become so well established, but it is an improper word and has not been accepted by the English dental profession. They use the word "orthodontics" to describe that science which has for its object the correction of the malocclusion of the teeth. Orthodontia, formed by the combination of Greek and Latin words, is supposed to mean "straight tooth."

As a matter of fact in the correction of malocclusion, while we are supposed to "straighten teeth," nevertheless, the greater part of our work is concerned with substances other than the teeth, i.e., the construction of the appliance is one important phase, but after the appliance is constructed and exerts force on the malposed tooth, the peridental membrane and alveolar process and other associated structures are more important from the standpoint of permanent results than are the teeth themselves. Therefore, orthodontia is too limited to describe what is known as orthodontics today, but the term, having been accepted, will probably always be used.

However, with "dental radiography" the condition is different. This is a new science in which the terms have not been accepted and the dental profession can be very easily influenced to use correct terms at this time. The word "radiodontia" is improper because when we make radiograms, we are often more interested in the structures surrounding the tooth than we are in the tooth itself. "Radiodontia," strictly speaking would mean a radiogram of a tooth which is only a small part of our interest. "Radiodontic examination" is another phrase that we find in print, which would mean examination of the tooth when in reality the radiographer is making an examination of the tissue around the tooth as well as the tooth itself. Instead of saying "radiodontic examination" it would be a "radiographic examination" which would result in "radiograms." The reading of those "radiograms" should supply some of the knowledge necessary to understand the case.

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We also find in current literature such statements as "radiographs of cases of root canal fillings before and after treatment" which should be "radiograms of root canal fillings." In fact we have before us a publication of a well-known dental organization in which we find three terms meaning practically the same thing: radiograms, radiographs and radiodontic records.

This in itself would be enough to cause a more careful consideration of words and shows the need for standardization of terms before the science of dental radiography becomes more chaotic than it is at the present time.

Nomenclature Relative to Malocclusions and Tooth Movements

WE have often called attention to the use of certain terms in orthodontic literature which fail to express the proper meaning when compared with other branches of science. Probably one of the greatest faults we find in orthodontic terminology is the use of "distoclusion" and "mesioclusion," as applying to the position of the mandibular arch in relation to the maxillary arch as well as the entire skull and face.

For "distoclusion" we should use the term "posteroclusion" and for "mesioclusion" the term "anteroclusion" when referring to mandibular arch relations.

In a recent paper read before the New York Society of Orthodontists, Dr. Stanton mentioned the fact that positions of malocclusion as described by orthodontic terminology were very confusing when attempting to interpret them in terms of other sciences. The argument which he made had been familiar to a number of men for several years and I think has been impressed upon all individuals who have attempted to teach malpositions of teeth to dental students. Certain confusions in the minds of students were called to our attention by Dr. Summa several years ago.

Experience has proved that dental students have been prone to place certain misinterpretations upon positions of malocclusion as described by the present terms. Confusion naturally arises if one is not familiar with the plan. It seems the trouble started many years ago when certain writers on dental anatomy succeeded in having adopted by the dental profession, the terms "mesial" and "distal" as applying to proximating surfaces of the teeth and then these terms were later adopted by orthodontists in describing the malpositions of the teeth.

Mesial and distal surfaces of the teeth as used by Dr. Black and other writers of dental anatomy in previous years have always referred to proximating surfaces. If it is understood that the term mesial and distal will always refer to certain surfaces which can be related to the median suture, then we consider the dental apparatus as a straight line with the centrals the median point. Distal surface is the proximate portion of the tooth that is farther removed from the median line when we consider the dental arch as arranged in a straight line from the central incisors. This in itself is slightly confusing, but if we remember that a mesial surface would always be the sur-

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face which is closest to the central point if the dental apparatus were a straight line, then the confusion to a certain extent disappears.

However, when we speak of positions of malocclusion, we find "mesial" and "distal" become confusing especially when we attempt to describe the direction in which a tooth must be moved. The trouble arises from the fact that the dental apparatus as we study it in a case of malocclusion does not have the teeth in a straight line, but the arch is more or less curved. From the mechanical standpoint, an object can be moved in three general directions: forward or backward, to right or left, and up or down. When we consider the directions of movement which must occur in malposed teeth and also in some instances, if a tooth has to be moved in three of those general directions; the terms mesioversion and distoversion, labioversion and linguoversion become confusing when applied to a different tooth.

When speaking of the incisors, a tooth that is in labioversion occupies an anterior or forward position, and has a position closer to the lips than it should normally occupy. When we speak of a tooth in buccoversion, in referring to the molars or premolars, we would have a tooth occupying a position the correction of which would require a movement that would be at right angles to the tooth that was in labioversion. Buccoversion signifies the outward movement from the center of the body either to the right or left, while the labioversion implies an anterior movement from the center of the body.

In referring to the movements of molars and premolars, it is well to remember that less confusion might arise if instead of speaking of buccal or lingual movements, or out and in movements, we referred to movements of molars and premolars as being to the right or left, which allows for no misinterpretation whatsoever when describing these teeth.

We find the terms mesioversion and linguoversion have likewise been confused by students and we have very often heard students describe a lingual position of a premolar as being one of mesioversion because they said the tooth was closer to the median line than it should be. The student while being incorrect in regard to the use of the term, was anatomically correct because a premolar in linguoversion was closer to the median suture than if it occupied its normal position in the dental arch because the teeth are not arranged in a straight line to right and left of the median suture.

It is equally confusing with premolars and molars when we speak of moving them mesially or refer to them as occupying a position of mesioversion. The molar or premolar that has a position of mesioversion has in reality moved forward and may not occupy any closer anatomical position to the median suture of the maxillary bones than when it occupies its normal position. It is true it will be closer to the mesial surfaces of the incisors because it has moved anteriorly and an "anterior movement" or "anterior position" would be more descriptive than would mesioversion. The incisor which occupies a position of linguoversion had assumed a posterior position to the other anatomical structures and to correct that malposition of linguoversion the tooth will necessarily have to be moved forward. Now, if we have a molar or premolar in linguoversion, that tooth would require a movement at right angles

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to the path of the incisors that was in linguoversion and the correction of the premolar would not be a forward movement as it was in the incisor but would be an outward movement to the right or left, depending upon which side of the mouth the tooth occupied.

We agree with Dr. Stanton that the terms for malpositions of the teeth as used today are confusing at least in attempting to describe tooth movements, and we feel certain there will be less confusion in the minds of students if the movement of a tooth is described in terms with which they are familiar, such as forward or backward, up or down, and outward or inward, or possibly instead of out or in, to the right or left. The only objection to these terms is that they have no anatomical significance whatsoever, but the movement of a malposed tooth is to a certain extent a mechanical procedure and can be better described in mechanical terms than in anatomical terms.

In describing a position of the tooth as regards up or down we have long used the words occlusally and gingivally. These terms become confusing because a mandibular tooth which is moved occlusally travels in the same direction that a maxillary tooth would follow if it were moved gingivally. Occlusally and gingivally could be used very satisfactorily if the term was limited and modified by the tooth that was being moved. For instance: the mandibular incisors sometimes are moved gingivally while the mandibular molars are moved occlusally, which would signify a downward movement of the incisors and an upward movement of the molars. At least those are the relative movements that we are attempting to accomplish in the treatment of certain cases; whether we actually do it or not is a question still debatable. However, we are convinced that for the benefit of the science we must drop the terms distoclusion and mesioclusion as regards arch relations and use anteroclusion and posteroclusion. We must dispense with the words labial, buccal, mesial, distal, and lingual when we attempt to describe the movement of malposed teeth during the process of the correction of the malocclusion.

We hope the Committee on Nomenclature of the American Society of Orthodontists will give the matter some attention as well as the Committee on Nomenclature of the National Dental Association.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The American Society of Dental Radiographers

The second annual meeting of the American Society of Dental Radiographers will be held in the Ambassador Hotel in Los Angeles, Calif., July 19, 1922. The following program has been arranged:

9:30 Business Session.
Roll Call.
Reading of Minutes.
Report of Officers and Committees.
Election of Members.
Unfinished Business.
New Business.

10:00 Scientific Session.
"The Importance of Radiography in Referred Cases from the Medical Profession."
J. A. Bliss, Los Angeles, Cal.

10:30 "Some Procedures Found Helpful in Making Dental Radiographs."
J. A. Blue, Birmingham, Ala.

11:00 "A Plea for a Standard Terminology in Dental Radiography."
Leland E. Carter, San Francisco, Cal.

11:45 "Problems of Dental Radiography."
A. R. Ebenreiter, Los Angeles, Cal.

2:00 "Encouraging the Use of the X-ray Machine by the Individual Dentist in his Office."
J. D. McAlpin, San Francisco, Cal.

2:30 "Economical Value of the Dental Radiogram in the Practice of Dentistry."
J. D. Millikin, San Francisco, Cal.

3:00 "Research Problems in Oral Radiography."
Clarence O. Simpson, St. Louis, Mo.

3:30 "Radiography and Diagnosis from the Viewpoint of a Dental General Practitioner."
Stephen A. Palmer, Poughkeepsie, N. Y.

4:00 Election and Installation of Officers.
Adjournment.

Officers: Henry C. McKittrick, President, I. O. O. F. Bldg., Indianapolis, Ind. James H. Prothero, Vice-President, Marshall Field Bldg., Chicago, Ill. Martin Dewey, Secretary-Treasurer, 501 Fifth Ave., New York, N. Y.

Pacific Coast Society of Orthodontists

A cordial invitation is extended to all interested in orthodontia to attend the next Annual Meeting of the Pacific Coast Society of Orthodontists, which will be held in Los Angeles, California, July 13, 14, 15, 1922. Those who

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contemplate being in attendance are requested to make known their intention to the Secretary as soon as possible. Charles G. Mann, President, Seattle, Washington. Carl O. Engstrom, Secy.-Treas., Box 1070, Sacramento, Calif.

Orthodontists of Los Angeles and Vicinity Organize a Society

On the twenty-fourth of March, there was organized in Los Angeles, a Society of Orthodontists to be known hereafter as the Southern California Section of the Pacific Coast Society of Orthodontists. It was decided at the organization meeting to hold four meetings during the first year, the meetings to be held on the third Friday of June, September, December and March. The membership is limited to those ethical and licensed practitioners who are in the exclusive practice of Orthodontia and after the year 1922, only those are eligible for membership who have been in exclusive practice for at least two years.

The Constitution and By-Laws of the Society are so written that they will not conflict with the parent organization, the Pacific Coast Society of Orthodontists, the idea being to have the members of the local organization eligible for either active or associate membership in the parent organization. A cordial invitation is extended to visiting orthodontists to attend our meetings, definite information concerning which can be had by applying to the Chairman, James D. McCoy, 908 Brockman Building, Los Angeles.

Items of Interest

Dr. Varaztad H. Kazanjian announces that he has resumed practice at 400 Marlborough Street, Boston, Mass. Practice limited to plastic surgery of the face, surgical prosthesis, and oral surgery.

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ORIGINAL ARTICLES

PRESIDENT'S ADDRESS BEFORE THE SOUTHERN SOCIETY OF ORTHODONTISTS, MARCH 14, 1922

Clinton C. Howard, D.D.S., Atlanta, Ga.

About twelve months ago in this same hall, it was my pleasure to meet with a small group of enthusiastic orthodontists whose purpose was the formation of a society, the highest aim of which would be in fostering the advancement of their chosen specialty. Today it is my greater pleasure to acknowledge the fruits of their efforts, so clearly manifest by your very presence here.

In a brief retrospection of thirteen years, it is recalled that at the beginning of this era the South was represented by only four orthodontic specialists. In this short period the number has increased to more than three score. Your Society boasts of thirty earnest members. That it will grow in worth can only be prophesied by the spirit of enthusiasm and good will as is shown at this, your initial meeting.

It has been said that aspiration is the law of human life; that every soul hungers for something vast and seeks that realm where it may be satisfied. It is not entirely impractical to apply such an esthetic sense to the organization of this group whose ambitions seek the lofty realm and whose purpose, as outlined in the tenets of our Society, couple the great deeds of service and efficiency. Because of such an institution our body social is made the benefactor, although the knowledge of this progress may, in reality, only be known to ourselves.

It will be all the more beautiful if we can render better service by the practical use of our combined knowledge without the lay public knowing of our existence as an organization. It is upon such a superstructure that this

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little band is to be builded and the service we render as specialists in the great field of medicine will depend upon what we put into it with just that idea in view.

We always get out of something, particularly an organization, a return in direct proportion to what we put into it. If we put honest effort and earnest work into our Society we naturally create a community of interest which must be beneficial to all. If that follows, as I am sure it will, with every member enrolled, then we are "dowered with the wealth" of two united principles—Service and Study.

Paraphrasing the great Ingersoll, we might say that within the magic bonds of these great standards some gracious, potent spell, imprisoned lies that, when released by effort and application, steals within the fortress of our selfish instincts and binds in sleep the captured sentinels of commercial greed.

AIMS AND PURPOSES OF THE ORGANIZATION

You have only a few moments ago unanimously adopted a code of By-Laws and Constitution upon which will rest the superstructure of this organization. There seems to be no pillar of support that will equal in worth or endurance the one which sets forth "The aims and purpose" of this Society—which reads as follows: "That it is organized for the advancement of orthodontia as a science and the promotion of good fellowship among its members." Will you not agree that the aims as thus advocated are entirely interdependent? Could one be separated from the other and the first still function? Good fellowship is essential to the advancement of scientific orthodontia as there would be but little incentive on the part of a member to give the fruits of his researches did he not feel that his efforts would be received by a warmth of appreciation and gratitude.

Politics, in its "every-day" vulgar meaning must have no place among us. There should be no outstanding domination either by an individual member or group of members, for with such, friction will creep in and weaken the bonds of fellowship.

ORTHODONTIA, PAST, PRESENT, FUTURE

It is probably true that for more than a thousand years some attempts of a chaotic nature were made in the correction of "crooked teeth." It was left, however, to Fauchard of France definitely to record a system of mechanical orthodontic apparatuses. His literary contributions were published in the year 1726. From this time down through the eighteenth and nineteenth centuries, little progress was made. The names, Magill, Coffin, Tucker and Kingsley are no doubt familiar to you. Each did his bit in the evolution of mechanical appliances. In these early days of orthodontia little was accomplished along lines of diagnosis or etiologic phases, or as to physiologic changes in bone development.

If my memory does not err it was about 1895 that Dr. Edward H. Angle first conceived the idea that the teeth of one jaw actually had a definite relationship to the teeth of the opposing jaw. And further, that conditions of

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malocclusion were similar in one of three respects, as follows: Either a normal anteroposterior relation of the arches, a posterior relation of the mandibular arch to the maxillary or an anterior relation of the mandibular arch to the maxillary. In short, he gave us a classification of malocclusion, or better expressed, a classification of jaw maldevelopment. One can but be impressed with the importance of his researches in this regard if you will visualize its direct influence in the sequential development of diagnosis and rapid evolution of appliances in the past twenty years. Fundamentally speaking, his work will stand as an epoch in scientific orthodontia.

The general conception of our work from the standpoint of malocclusion of the teeth has only in the past few years taken on a much broader vision. We now look beyond that which was once conceived to be a condition expressed by "crooked teeth" and accept these malplaced teeth as a result, the condition being a perversion of bone development. To summarize the latter expression, the bone structure in which the teeth develop and erupt, must be of proper volume and shape to permit of normal occlusion. Here we have a hypothesis to base our further researches in broadening our conception of etiology and diagnosis. We immediately pass beyond the narrow bounds of tooth arrangement and begin to see expressions of histologic, physiologic and biologic phenomena.

Permit the prediction to be made that the future scientific strides in our specialty will not be confined to further development of mechanical appliances, but will proceed from a greater vision into the correlation of jaw development with a perversion of general skeleton development.

Apparatuses for the placement of teeth are perfected to a state of efficiency to satisfy the most exacting technician but who among us will doubt that we have deficiencies of diagnosis? Is there a living orthodontist with a mental perspective backed by years of experience who will emphatically state that all conditions of malocclusion embracing the three great classes can be accounted for by the present accepted etiologic factors? A conception of local causes is readily perceived. A loss of approximal contact in perverting normal occlusion, or a lip-habit or a tongue- or cheek-habit, a pacifier or thumb sucking, will each disarrange the normal position of teeth. The results of such causes are easily analyzed and accepted as most tangible facts. On the other hand can we be satisfied with the stereotyped explanation for the productive agent of the two great groups of malformation known as "Class 2—Division 1 and Class 3"? In these anomalies we are confronted by more than tooth disarrangements. The body of the mandible, the superior maxillae, the maxillary sinuses, the internal structures of the nose and middle face, are all defective. This being agreed, then how can we even pause in considering the malrelation of the teeth as a condition when under such circumstances their positions are, *per se,* not at fault, but the actual malformation of the bones should first demand our serious analysis? To carry the thought still further the jaws and their immediate associated bones are integral parts of the total skeletal structure. Can we separate, as though a dividing wall intervenes, the jaws and their development from the general metabolism of the en-

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tire skeletal formation? Then why should the researches of the orthodontist be, for a moment, confined to the narrowness of one field of study? Is there a branch of medical science which is not interdependent with every phase of the human organism? Suffice it to say, that certain malformations of the bones constituting the dental arches and jaws may some day be treated *without mechanical appliances,* but recognized and diagnosed as merely a correlation of a general physical deficiency.

Orthodontia is about to be challenged in this regard. Shall we decline a more far-reaching outlook and be content with our present knowledge, or shall we collaborate with other interested allied sciences and thereby earn a greater recognition in the realm of curative medicine?

CONCLUSION

Orthodontia, in the blessed realm of Dixie, has become a distinct entity, and this organization, by its very act of unity has cemented a group with a definite purpose who go forth, not only to the dental profession, the medical profession, but to the public with a real place in the economy of the human status.

The progress of orthodontia has been slow, as the history correctly records. The history of all real achievements shows various barriers, which when penetrated or overcome, develop the roadway lying midway between enthusiasm and criticism. We have been the target of not only our profession but of that of every allied profession, and yet we emerge with a banner unsullied and unstained with something to offer of fixed value. This very fact vindicates the purpose of this organization and we should feel proud that we are privileged to sit among the organizers of the Southern Society of Orthodontists and participate in the deliberations of men who would, without the idea of personal aggrandizement, offer their experience and judgment as a framework for a common good to a greater number.

We have however yet a greater duty—that of study. We realize our shortcomings and this very fact should be a stimulus for research hitherto unknown in this section.

This organization, now small, should be a pet of ours. We should nurse it and fondle it and raise it as we would our baby. However, there is but one way to do that, and that is to remember its purposes: the meeting and exchanging of ideas, the report of failures, the reason for successes and the dull grind of finding something new. We all have successes and failures, but new ideas from systematic study are the things that will make our association a permanent and successful organization.

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ORTHODONTIC TREATMENT COMPLICATED BY REPLANTATION OF AN UPPER LATERAL*

By Walter A. Crane, M.R.C.S., L.R.C.P., L.D.S.

THIS case is not intended as an orthodontic triumph at all, being a small case which presented itself minus the left upper lateral incisor. On December 20 last year the child was brought for consultation, and examination proved, as will be seen from the models, that the molars were in slightly distal occlusion. The upper centrals were rotated distally, while the right lateral was very much protruding mesially, with no signs of the left one, which proved to have been kicked out during physical exercise at school fourteen days before. The socket was almost granulated up, but not com-

Fig. 1.

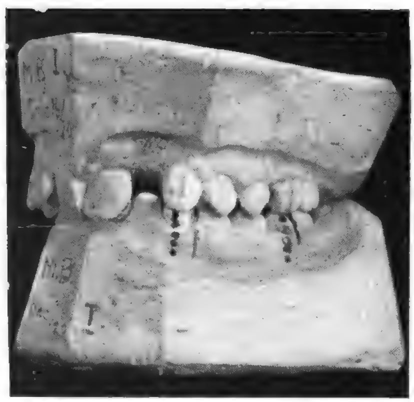

Fig. 2.

pletely so. A hunt was made for the tooth, and it was brought in the following day covered with garden sand and ink, and I attempted to wash it as well as possible in hot water without actually boiling it, and soaked it in normal saline solution for eighteen hours. The canal was cleared out and filled in the usual way with G.P. points. On the sixteenth day after the accident the lateral was replanted under novocaine by curetting the socket and fastened with the usual covering splint. The child had a tubercular scar of twelve months' duration on her neck, and the mother was anxious to have no more done than absolutely necessary for fear of injuring the child's general health.

In the first model you will see the slightly distal condition of the molar with the crowded condition in the front.

The splint was taken off on April 1, three months afterwards. The position on the model shown here corresponding, from the mother's statement to that before the accident, though at the time of replantation some difficulty

* Delivered to the British Society for the Study of Orthodontics, October 3, 1921.

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was experienced owing to the central and canine having come somewhat together.

The tooth is perfectly healthy, with no sign of a pocket of any description. I thought it right to insert an inclined plane in the upper jaw, and you will see the models of the case as it is now. It is not otherwise an exceptional orthodontic case, but as the mother would not undertake any further treatment than permitting the centrals to be rotated and drawn out

Fig. 3.

Fig. 4.

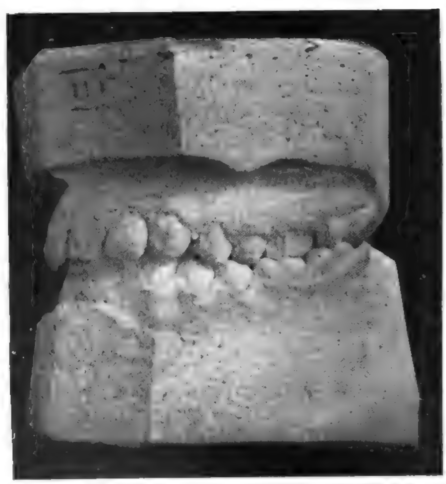

Fig. 5.

with an Angle's apparatus and an inclined plane put in as a retention apparatus, the treatment had to cease.

The President said Mr. Crane had presented a case of some considerable interest, and, although it varied somewhat from ordinary orthodontic treatment, it was no doubt a matter which the members would like to discuss.

Mr. Pitts suggested that in a case where the tooth was contaminated with soil there might be a possible risk of tetanic infection. The method

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of sterilizing the tooth did not seem very adequate from that point of view, and he would like to know if planting the tooth in the socket provided any ground for such an organism, which was anerobic.

The President said that some years ago he remembered Mr. Morton Smale referring to a case which came under his experience of a replantation of a lateral incisor tooth. It occurred in a fellow schoolmate. The lateral incisor had been displaced in the school playground when the patient and Mr. Morton Smale were schoolboys together. The tooth fell on to the ground and was immediately replaced in its socket, and Mr. Morton Smale heard no more concerning it until he met his fellow student twenty years later, when the matter was referred to. On looking into the mouth Mr. Morton Smale discovered that the tooth was still there. The only point of difficulty about it was that the tooth had been placed the wrong way round and had remained in that position from the time it had been replanted. The importance of such cases of replantation was that the teeth should be replaced immediately, and if the replantation was done under the precautions Mr. Pitts had mentioned, not only was it possible to maintain the healthy activity of the peridontal membrane but the pulp would remain vital also. He believed in Mr. Morton Smale's case the pulp was vital even after the twenty years.

Mr. Warwick James said he had once had a case at the Dental Hospital of a boy with a large dentigerous cyst associated with the left central incisor in the maxilla. The right central was displaced and rendered useless. The cyst and both the teeth were removed. Later the lateral incisor appeared at the posterior margin of the hard palate, apparently displaced by the cyst, and the right lateral had fallen a good deal across to the left side. He thought nothing could be lost by attempting transplantation of the tooth. He made a socket and removed the lateral from the palate and placed it in the best position in the front of the mouth, and the boy retained that tooth, and when he saw him three years later it was quite satisfactory. The house surgeon said that it reacted to heat and cold, but he himself thought it was very slow in its action. He did not destroy the pulp. It looked as if the tooth might remain for a very long time. The greatest difficulty he had was in obtaining tissue. There was so much loss of tissue owing to the removal of the cyst that the fold remaining was only about one-eighth inch thick, gradually widening towards bone. Only a short portion of the root of the tooth could be inserted in the bone, a socket being made by the use of a fine antral drill. He thought it an extraordinary thing that it should remain as it had done.

Mr. Crane quite agreed with Mr. Pitts, and said that his heart was in his mouth when he replanted the tooth as regards transmitting any infection. It was washed in hot water as well as possible and soaked. The proof of the pudding, however, was in the eating. It was not very surgical, but the child was in extremity and was going to be a pretty woman. It was a case of taking a chance. After fourteen days he did not risk more thorough sterilization, as there were a few fibres of periosteum still adhering to the root which he did not wish to destroy, if it could possibly be avoided.

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A CASE OF UNDERHUNG BITE*

By F. St. J. Steadman, L.D.S., L.R.C.P., M.R.C.S.

These models illustrate a case of underhung bite in a boy aged 6½ years. The father and the father's sister also had the same condition. He had only seen the patient recently, when he had the condition shown in the models. The interesting question was whether anything could be done for him. Personally he was inclined to let it alone and do nothing. The actual cause appeared to be the usual one in such cases, an overgrowth of the ascending ramus. The only permanent teeth present are the six-year-old molars and left lower central incisor.

Fig. 1.

Mr. Harold Chapman said the case was a very interesting one and it would appear that there was a question of heredity involved, and one would be inclined to put it as a Class III class. The four permanent molars seemed to be in normal occlusion, but that might be only relative, on account of unequal medial movement due to the early loss of the deciduous molars. It is conceivable that they might have moved equally, so that the case might belong to Class I. It was rather difficult without very careful examination to decide, but whichever class it was it seemed to him that the appearance of the boy when he was 10 or 15 years older would be considerably marred if the condition were perpetuated. He would be inclined to undertake treatment to correct it, certainly when the permanent incisors were erupting in the upper jaw, if not at the present time. He had only recently seen a

*Read before the British Society for the Study of Orthodontics, October 3, 1921.

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similar case but rather older, with regard to which the parents were not willing to have anything done at all if it was only a question of improving the boy's appearance, although if it was a question of health they were willing to have treatment undertaken. While he could not assure them that it was detrimental to health, he felt sure that in ten years' time it would be detrimental to the boy's appearance, and the same applied to Mr. Steadman's case.

Mr. Steadman said the boy's appearance at the present moment was distinctly good and he was not at all sure that he agreed with Mr. Chapman that in underhung cases the appearance was necessarily bad. He had seen plenty of underhung people with faces quite good. It looked worse in girls than in boys. The boy he had referred to did not now show that he had an underhung bite at all.

TREATMENT OF CASES IN WHICH THE BITE IS TOO CLOSE*

By W. Warwick James, O.B.E., F.R.C.S., L.D.S.

THIS paper is the outcome of a consultation with one of our members in which he advised extraction of premolars whilst I urged retention. There were many reasons in support of his argument—neither patient nor parents were likely to be helpful with the treatment, the second molars were presenting, and the boy went away to school, rendering regular attention very difficult. During our discussion I realized that I had adopted a new line of procedure which had as a base the old bite-plate, but with a marked modification. I therefore promised to bring the subject before this Society.

Two special features of my method of treatment need to be emphasized—one, that the molars are permitted to rise (more correctly develop) until the bite is propped open; the other, that treatment be undertaken at as early an age as possible.

Time does not allow me to discuss the many views explaining the changes during development of the jaws, whether normal or abnormal, but I would like to give you some of the steps in my own reasoning. As a student in the 'nineties I was taught that in the majority of cases the only effective method of treatment of cases of irregularity of the teeth was by extraction. Expansion of the maxillary arch by means of the Coffin spring was attempted occasionally, but with extraordinarily little success. Fixed appliances (then recently introduced by Dr. Angle) were much discussed, but regarded as too complex for hospital patients except for the purposes of teaching. In one case, which lived in my memory, a Coffin expansion plate was used capping the premolars; directions were given to the patient to stretch the spring daily. She was prevented from returning to the hospital for six months,

*Read before the British Society for the Study of Orthodontics, October 3, 1921.

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but when she did so, not only had the arch expanded, but the malocclusion was corrected. Inadvertently my present method had been practiced.

As the result of considerabe experience in private practice, and as dental surgeon at two hospitals, it seemed possible to correct malocclusion in two planes (lateral and antero-posterior), but the third (vertical) seemed too difficult, as I stated in a paper read at the International Medical Congress, 1913,* from which I would like to make a quotation as expressing my views at that time:

"The succession of changes in the process of development of the jaws during the period under discussion comprises growths of the bones and eruption of the permanent teeth with loss of those of the temporary series.

"The development of the bones is such that the additional space required for the permanent teeth is supplied, growth takes place in several directions, but the exact changes are not definitely known. It seems possible that the

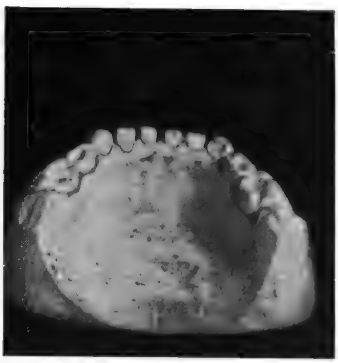

Fig. 1.—Model of the mandible of a boy aged 5, showing spacing of the incisors which have undergone attrition from edge to edge occlusion.

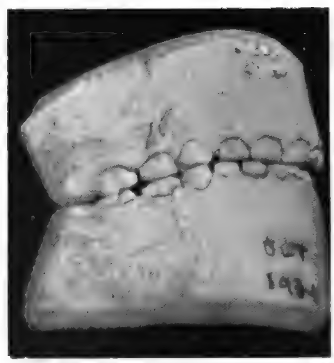

Fig. 2.—Models showing the advanced mandible and attrition of incisors. The first molars are about to erupt and the tissues over them are seen to be in occlusion.

presence of the teeth may have a special influence; interstitial growth has been assumed to take place in the mandible, although it is most difficult to conceive.

"Prior to and during the period of eruption of the permanent teeth the development of the jaws can be observed. The dental arches increase in size, the incisor teeth of the temporary dentition become spaced; the jaws in the region of the temporary molars are wider, as has been shown by measurement in a few cases; and the jaws show an increase in length in the antero-posterior direction in order to allow the first permanent molar to come into position. A change which, in the opinion of the writer, is of great importance consists of an alteration in the relationship of the mandible to the maxillæ. Previous to the eruption of the first permanent molars the mandible appears to develop in such a manner that the incisors no longer occlude posteriorly

*One of the papers read before the joint sections of Hygiene and Preventive Medicine and Stomatology, opening a discussion on "The Supervision of the Health of Children between Infancy and School Age."

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to those of the maxillæ, but assume a more or less edge-to-edge occlusion. The marked attrition of the temporary incisors is explained by this change, and is an indication whether it is occurring or not. The normal occlusion of the first permanent molars is permitted by this change; but if it does not take place the mandibular teeth will probably assume a postnormal relationship, as the second temporary molars will still have their posterior surfaces in almost the same vertical plane. The establishment of this view is difficult, as the movements of the mandible are so free in a child, a very wide range being possible. Models show the edge-to-edge occlusion is probable, but also that other positions are possible. It is sufficient to examine the mouths of children to be sure that this edge-to-edge occlusion occurs. It is my opinion that a case calls for careful consideration if the attrition marks on the temporary incisors are not definitely seen at the age of 5½ years.

"Normally the teeth should stand upon well-formed alveolar processes;

Fig. 3. Fig. 4.

Fig. 3.—Models of a boy aged 2 years 5 months, showing postnormal position, with mandibular incisors completely hidden and impinging upon the gum of the maxillae. The second temporary molars, particularly those of the mandible, are imperfectly erupted.

Fig. 4.—Models of a boy 1 year, 7 months later than Fig. 3, showing the second temporary molars have been permitted to erupt and the mandible advanced, bringing the incisors into almost correct occlusion, the changed relationship of the temporary canines almost being noticeable.

too little attention has been directed to imperfect development in a vertical direction, probably because the treatment of the condition appears almost hopeless. This condition is only too common, and is associated with recognized imperfections in the development of the jaws.

"Some of the causes of imperfect development of the dental arches are known, but our present knowledge cannot be regarded as other than vague. That nasal obstruction is a most potent factor is certain; that loss of temporary teeth at an early age is a cause of much importance has long been recognized, although in some cases ill-effects do not result; of the deformities caused in infancy, those produced by habits constitute a larger group than has been thought; the general development of the child may be impaired by ill-health, by insufficient, or poor food, which may have a local effect as

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in the case of rickets. Local affections also may exercise a marked influence.

"The interest which is now being taken in the deviations from normal development of the temporary dentition should be productive of a far greater knowledge than we now possess of the normal changes in the jaws. Until quite recently dental surgeons did not attach much importance to the stages prior to the eruption of the permanent teeth."

Later in the same paper, in reference to cases of postnormal occlusion, I said:

"Where the mouth is constantly open the muscles are at a disadvantage

Fig. 5.—Plate used in case shown, Figs. 3 and 4. It was worn constantly night and day and the occlusion with the plate in position is such that the forward position of the mandible is the only efficient one that can be assumed during mastication. Those having care of the child constantly directed him to keep the lips closed.

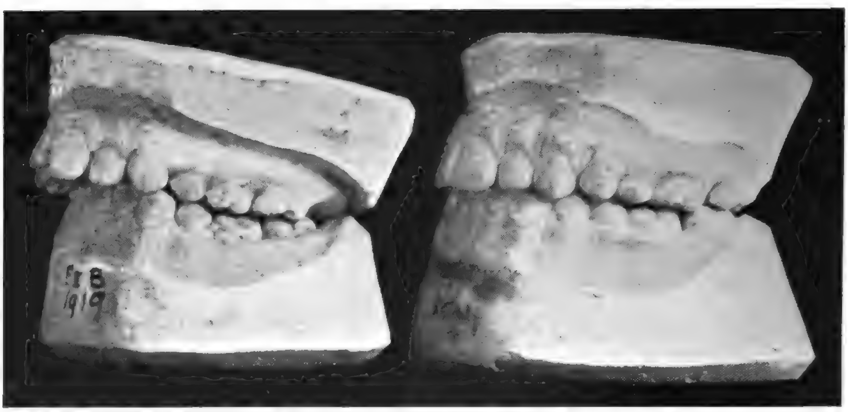

Fig. 6. Fig. 7.

Fig. 6.—Models of a girl aged 13 with marked postnormal occlusion. The protrusion of the maxillary incisors was most unsightly, while the backward position of the mandible completely spoiled the balance of the face.

Fig. 7.—Models of case shown in Fig. 6 at 17 years. The molars have been allowed to erupt and the mandible advanced. The bite-plate was similar to the one shown in Fig. 10, the maxillary premolars and temporary molars were capped, "raising" the bite, while an inclined plane upon which the mandibular incisors impinged, compelled the forward position to be assumed. The narrow maxillary arch was expanded by means of the jack screw (Fig. 11), and as the width of the arch increased, new plates had to be made or a new jack screw inserted. The patient was directed to cease turning the screw when the halves of the plate began to work loose, but to continue wearing the plate until she could be seen; in this way some weeks' interval can be tided over when the patient is at school.

A plate as shown in Fig. 17 was used as a retention plate.

in supporting the mandible and the structures attached to it below. The weight of the pharynx and larynx constantly tends to displace the mandible in a downward and backward direction. In mouth-breathers where the jaws

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are not occluded this force is sufficient to hamper advancement, or may actually cause backward displacement of the mandible. This view is introduced as it partly accounts, I believe, for the impaired respiration in mouth-breathers, the backward displacement of the tissues causing some obstruction. It is well demonstrated in patients under an anæsthetic, particularly in a sitting position, for if the mandible be pulled forward respiration is markedly free, while backward displacement of the mandible with the mouth open causes marked obstruction. In the dead subject, when the muscles are quite passive, the mandible from the mere weight of the structures attached assumes a posterior position. A child whose mandible had assumed a postnormal position (associated with tongue-sucking) was advanced with such marked benefit to health that the father, a medical man, commented upon it. The greater freedom of respiration seemed to be the only explanation. The

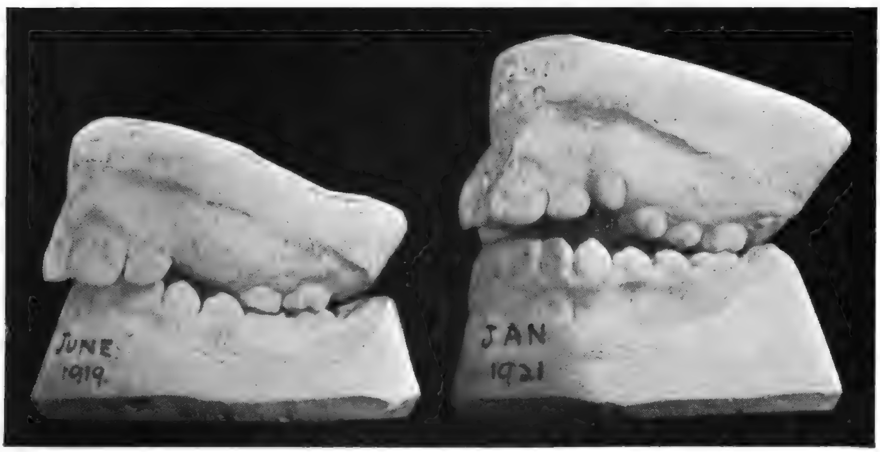

Fig. 8. Fig. 9.

Fig. 8.—Models of a girl aged 8, showing the imperfectly erupted mandibular molars, which is more marked than in those of the maxillae, as is usually the case, although all are affected.

Fig. 9.—Models of case shown in Fig. 8. Patient is now aged 11 and still under treatment, the bite-plate being worn; the open bite due to the more fully erupted molars which are in occlusion when the bite-plate is in position. The second premolars have been freed and are being allowed to erupt. The protrusion of the maxillary incisors is being corrected by the use of rubber dam at nights (Fig. 16). The mandibular incisors bite upon the vulcanite of the palate plate, which has been filed behind the maxillary incisors at the points which would prevent their retraction.

dental arches were well developed, and there was no nasal obstruction. It has constantly been stated that imperfect aeration of the blood is a result of nasal obstruction and the view expressed above may be the true explanation, as apart from this there does not seem to be any reason why air should not enter as freely through the mouth as the nose."

I would also like to quote from another paper in which my views affect the question under discussion. In 1909 I wrote a paper upon the eruption of the teeth.* Later in a paper written with Mr. A. T. Pitts† upon the dates

*"A Preliminary Note on the Eruption of the Teeth." A paper read before the Odontological Section of the Royal Society of Medicine, 1909.

†"Some Notes on the Dates of Eruption in 4,850 Children under Twelve." Paper read before the Odontological Section of the Royal Society of Medicine, February, 1912.

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of eruption of the teeth, the views expressed in the former paper were summarized as follows:

"A completely erupted tooth presents the following characteristics: the crown of the tooth projects so that all the enamel is exposed except that portion covered by the free margin of the muco-periosteum (gum). The root of the tooth is firmly planted in the alveolus, which should be on a level with the neck of the tooth. The periodontal membrane, is completely developed. The gum is firmly bound down to the bone, presenting a thin, even margin in close contact with the tooth immediately beyond its continuation with the periodontal membrane.

"The changes occurring during the period between the earliest state, when the tooth is buried deeply in the tissues, and that of complete eruption, need to be considered. Much discussion has taken place concerning the nature of these changes. It would appear to us that there are two distinct factors bringing about this alteration:

Fig. 10.

Fig. 11.

Fig. 10.—Vulcanite bite-plate, showing the capping of the temporary molars or premolars, and the plate divided for expansion by means of the jack screw. Difficulty in keeping the plate in position is met with occasionally; the necks of the teeth should not be touched, but the hollow for the cusps may be increased by drilling out the vulcanite or by placing a thin layer of metal (patten lead) over them before vulcanizing.

Fig. 11.—Badcock jack screw with second guide added. The plate is rendered much stronger and steadier by adding a second guide which should be stronger than the one made with the screw part.

"(1) A process of advancement of the tooth in the tissues; this is generally recognized.

"(2) A process of denudation by absorption of the tissues overlying and surrounding the tooth.

"With regard to the first factor, we are of the opinion that the point of eruption is determined by the presence of the epithelial columns connecting the oral epithelium with that lining the tooth-follicle. The advancement of the tooth is partly due to unequal rates of growth between the various tissues surrounding the tooth. We think it probable that the elongation of the root plays some part in advancing the tooth as represented in the following diagram. (An illustration was introduced here representing a tooth situated close to the lower border of the mandible.)

"This is supposed to represent a lower incisor; we know growth occurs

at the point marked with an arrow. As the crown is calcified it must either advance or the tissues below must be replaced. It is impossible to imagine, when we consider the length of the root, that concomitant growth of the jaw takes place to the same extent; and if x-rays of the jaw—*e.g.*, those of Symington and Rankin—be examined, it will be seen that the base of the tooth where the root is going to be formed is so situated that it cannot be elongated in a downward direction. Another factor in the different rates of growth will appear to be the activity of the immediately supporting tissue which may be regarded as carrying the tooth to its final position, a view supported by other observers.

"So far, we have considered the unequal growth of tissue in a vertical plane only, but concurrently with this, unequal growth also occurs in a horizontal plane. Sections made by one of us show that the epithelial column,

Fig. 12. Fig. 13.

Fig. 12.—Models of a boy aged 11½ with postnormal occlusion and the mandibular incisors impinging upon the gingival margin immediately behind the maxillary incisors. The bite-plate was worn continuously in spite of several teeth having been filled, no new carious cavities arising. The plate was scrubbed twice daily with a nailbrush and swilled under the tap after each meal; these being the usual directions given to the patients.

Fig. 13.—Models of case shown in Fig. 12, 14 months later. The case is still under treatment. The occlusion has been altered and the maxillary arch expanded by the method usually adopted. A plate similar to that shown in Fig 17 is being worn and rubber dam used at night. The boy is away at school and can be seen only in the holidays, as is the case with many of these patients. Some patients have been seen once during the term when the expansion screw has become too loose for the plate to be worn with safety.

connecting the oral epithelium with the follicle, undergoes degeneration centrally, and proliferation of the deeper cells of the oral epithelium takes place. With this change an unfolding occurs in the upper part, thus exposing a lower portion which in its turn undergoes a similar change. This reduces the depth of the tissue overlying the tooth, which is therefore passive so far as the change is concerned. The process may be compared to the opening of a book, the hinged portion being advanced *pari passu* with the separation of

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the pages of the volume until it comes to occupy the same level as the free edges.

"The second point that we wish to make is the process of denudation as a factor in exposing the teeth. This factor plays an important part in the final eruption of all teeth, coming into play earlier in some cases than others. The tooth which best illustrates the process is perhaps the first mandibular molar. If the first molars be examined in their earliest stage of eruption, it will be seen, in the majority of cases, that although only just piercing the gum, they are in partial occlusion. There still remain ways by which room for the advancement of the tooth is possible. This space could be obtained by a closer adaptation of the occlusal surfaces; by a lengthening of the ramus of the jaw and by an advancement of the mandible: we believe all these do occur. The last factor, though not yet established is, in our opinion, of importance. Yet we do not think these factors of themselves sufficient to account for the complete eruption of the teeth by advancement, and we

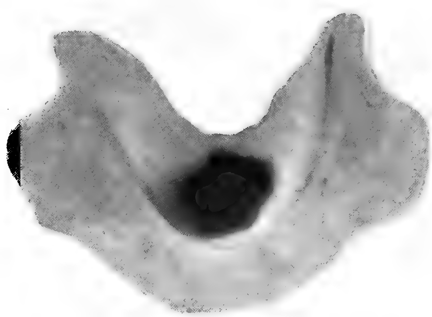

Fig. 14.

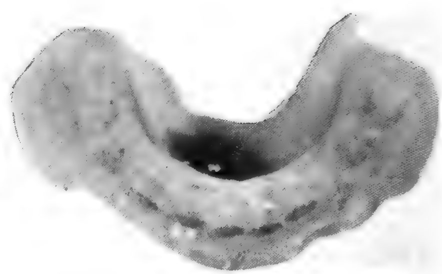

Fig. 15.

Fig. 14.—Wax make-up on plaster model, capping the temporary molar or premolars [in some cases, particularly young children, the temporary canines or even the incisors (see Fig. 5.)], with an inclined ulane for the mandibular incisors to impinge upon while the first permanent molars are left free (the second temporary molars in early cases).

Fig. 15.—Wax as in Fig. 14 upon which the patient has been allowed to bite. The redundant wax in front of the marks of the incisors would hide the maxillary incisors if the wax were upon the model.

The correct bite is best secured by obtaining an edge to edge occlusion of the incisors and allowing the mandible to slide backwards until the correct position is obtained. It may be necessary to add wax to the incisors inclined plane which must be so arranged that efficient mastication is only possible in the forward position.

are of the opinion that the explanation must be sought for in the denudation of the tooth by absorption of the tissues overlying it, a change which we regard as being mainly due to the functional stimulus of mastication.

"It is probable that everyone will agree that a tooth which has already perforated the gum is further exposed by the absorption of the tags of gum overlying it. We would like to point out that if this process be continued until the loose flaps of gum are removed down to the neck of the tooth—leaving the gum closely attached to the periodontal membrane, with its free margin protected by the bulge of the tooth above it—the state of complete eruption is reached. The difficulty of determining the conclusion of this

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latter stage is considerable owing to the long period of time occupied even in healthy mouths. In unhealthy mouths, as in the case of the incisors in mouth breathers and other conditions of impaired function, the change is much prolonged. Some cases, indeed, would appear to remain in a state of incomplete eruption almost indefinitely. This is particularly so where a condition of so-called 'pyorrhœa' becomes established, as this affection is undoubtedly liable to occur in mouths where the absorption is incomplete."

The discussion upon this paper should give rise to criticism of the views expressed in these quotations, particularly as far as they affect the line of treatment I am advocating for those cases in which vertical development is deficient and a too close bite results. A mandible in the postnormal position causes the occlusion of the molars to occur prior to their full vertical development. This is well demonstrated by advancing the mandible to the correct position, when a considerable space is present between the occlusal surfaces of the respective molars of the mandible and maxillæ. The stage of eruption

Fig. 17.

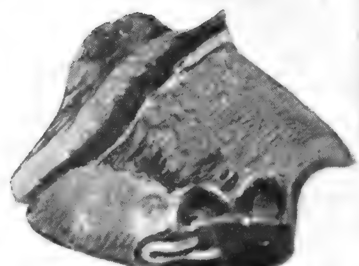

Fig. 16.

Fig. 16.—Shows a bite-plate cut for expansion but to show particularly the hook inserted in the vulcanite of the wing overlapping the premolars. This type of hook has been found to be the most suitable form for holding the rubber dam which is stretched across the front teeth of the maxillae at night. The smooth surface shows where the plate has been cut away to allow the incisors to be retracted, whilst sufficient vulcanite has been left to occlude with the mandibular incisors, which are prevented from rising.

Fig. 17.—Shows a retention plate which maintains the arch. The mandibular teeth being unable to occlude in any other than the forward position, in due course establish occlusion in this position, the elevated molars being the chief factors in effecting this change. The hooks for retracting the incisors are here seen soldered to the wires which support the plate.

of the molars during which the tooth with the surrounding tissues approaches those of the opposite jaw, and which should permit of full development, is restricted to the limited vertical space resulting from this postnormal position. The denudation stage of eruption leads to exposure of the crowns of the teeth, whilst complete eruption in most cases never occurs. Tags of gum may remain upon the teeth for long periods, caries is frequent, mainly because food collects easily, but also because cleansing by mastication, with the tongue, or by artificial means is difficult and imperfect.

It will be generally admitted that postnormal occlusion and mouth breathing are almost constantly associated, but it is well to emphasize that there

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are some who keep their lips apart although they do not breathe through the mouth. The important factor is that the jaws are apart during the greater part of the twenty-four hours.

The importance of heredity in these cases must not be overlooked, although it is difficult to do more than note that similar conditions are found without doubt in parents and children, and that many in one family may be affected; in spite of this, a common factor may be the cause.

Examination of patients, or of models in which the bite is too close, shows the crowns of the molars imperfectly exposed, whilst the mandibular incisors have an elevated appearance and those of the maxillæ frequently protrude. If the occlusion of the jaws be examined, the mandibular molars and canines are nearly always postnormal, whilst the incisors are generally in contact with the palate. If the mandible is advanced so that the incisors bite as near as possible into the normal position, a considerable gap exists between the teeth posterior to the canines. The establishment of the mandible in this position, with alteration of the relationship of the teeth, is what should be aimed at in the treatment of the majority of these cases.

It is of interest that advancement of the mandible with the eruption of the third molars has been described. At the Royal Dental Hospital, I remember Mr. Leonard Matheson describing some cases, one a member of his own family, I believe.

The method adopted in order to bring about a fuller development in the molar region, consists of the introduction of a vulcanite plate, which removes the bite entirely from the molars by capping the maxillary temporary molars or premolars, as the case may be, and by means of an inclined plane which engages the lower incisors and compels the patient to bite in the forward position only. A lower plate may be used at times. The technical details comprise a plaster of paris impression, a wax bite-plate made to cap the temporary molars or premolars, and with an inclined plane for the incisors to bite upon. Previous to taking this bite, the patient must be shown the exact position in which the teeth are to be placed together. This is best done by asking them to bite the front teeth together and then to slide the lower incisors inside the upper ones until the corrected position is obtained. When the wax bite-plate is introduced, the correct position can be obtained without any difficulty, although one or two attempts may be needed in some cases. The wax, trimmed up and corrected for vulcanizing, may be tried again, but usually it is unnecessary. Wax may be added in order to depress one or two of the mandibular incisors which usually need correction, and grooves cut on the inclined plane in such a manner that a lower canine may be directed forwards and outwards. In the majority of cases a jack screw is inserted, the form introduced by Mr. Badcock being by far the most useful; a second guide should be added in order to strengthen the plate. This is particularly necessary when the halves of the plate become widely separated. (The Dental Manufacturing Company are making a jack screw after this pattern.)

The particular details in each case can be readily determined by the

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operator, the variation depending upon the type of case and the age of the patient. The earlier the correction can be effected the better for the subsequent development of the jaws, as the normal development is more closely approximated.

Much nonsense has been talked about the impossibility of effecting changes in the temporo-mandibular articulation, as if the adult joint existed in the infant. The development of the joint must be influenced if the occlusion be altered in infancy, but the later in life the attempt is made to correct a postnormal occlusion, the more necessary is it to adapt the procedure to the established conditions.

Although it is not my intention to deal with the subsequent treatment, I have found one procedure exceedingly valuable. When the condition of open bite has been established in the incisor region, if the teeth are spaced, or in a patient in which the extraction of the first premolars has been necessary, an arrangement is made by means of which rubber dam can be used at night, stretched from hooks attached to wires on the first molars of the retention plate, or even, at an earlier stage, from the vulcanite overlapping either the temporary molars or premolars (see Figs. 16 and 17).

A slight difficulty occurs at times in keeping the plate in position, particularly when the temporary molars are shallow; assistance is obtained by relieving the plate over the cusps of the teeth either by a thin layer of metal prior to vulcanizing or by drilling the vulcanite away afterwards. At times a metal crib can be used in place of the overlap of vulcanite on the second temporary molars. Any particular case can usually be met by a special device which will suggest itself to the dental surgeon. The notes attached to the illustrations should make the chief points clear.

DISCUSSION

The President said Mr. James' paper was an interesting one on a subject which was constantly presenting itself in the treatment of orthodontic cases, and, as Mr. James said, the condition was one which was only associated with postnormal occlusion, especially in those who were mouth breathers.

Dr. Sim Wallace said he was fully in agreement with almost all that Mr. Warwick James had said, and he believed that in one of his own prehistoric papers he spoke of the muscles pulling back the jaw and preventing the proper growth. He did not exactly like the way Mr. Warwick James put the matter when he said that the mandible was displaced backwards, because he did not think it was displaced backwards; it was the action of the muscles pulling it backwards which prevented it growing forward. The growth of bone at the posterior border of the ascending ramus of the jaw would grow forward. In some things, however, he was not quite prehistoric, and he had brought forward another little thing which he thought added to the knowledge of the etiology of the subject; it was with regard to the occlusion of the incisors at a very early age. Mr. Warwick James had shown that the development of the bone might be stimulated by a continual bringing forward of the lower jaw by a vulcanite plate, but there was another way whereby the growth forward of the jaw could be stimulated, and that was by the constant apposition of the lower incisors with the upper incisors in the act of gnawing. Although Mr. Warwick James said the deviation could be detected at 2 years of age or even earlier, he himself believed that in a proper case it was visible practically immediately the teeth were erupted. In a very early case he had watched the incisors coming up into position, and instead of the child gnawing

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he held his mouth open and by the time the incisors had erupted the bite was close and the lower incisors were up against the gum. The first thing that brought about normal occlusion, he considered, was the constant apposition of throwing forward of the lower jaw to gnaw.

Mr. Pollitt, referring to the case which Mr. Warwick James had treated at 2 years of age, asked whether the treatment would be the same in the case of a normal mouth breather and also whether the child wore the plate at night and whether there was any difficulty with regard to the wearing of the plate, difficulty especially in eating.

Mr. Highton asked whether Mr. Warwick James used the expansion screw in conjunction with the vulcanite plate and, if so, whether there was not a danger of expansion in the upper molar region.

Mr. Pitts said that, interesting as were the results which had been brought forward, he thought the views concerning the etiology of the condition were even more interesting. Mr. James had quoted some earlier papers in which he mentioned that certain changes occurred in the jaws of children and on that based certain inferences. He remembered at that time being closely associated with him at the Hospital for Sick Children, and the matter being very frequently pointed out, and also remembered Mr. James speaking of the spreading of the incisor teeth and also of the attrition and change in the relationship of the mandible to the maxilla. He had often verified these observations since and was more than ever convinced that they were correct and had not received the attention of the dental world that they deserved, but he was not at all sure now that he was prepared to place the same inference on those observations as he did when he saw the cases with Mr. James. It was quite true that in the majority of children attrition occurred, and he himself regarded that as being a sign of normal growth, together with spacing, but with regard to the movement forward of the mandible he would like to ask whether it was really so. It was quite true that if a child of five, in whom attrition was well marked, so that most of the overlapping of the upper incisors had been obliterated, were asked to bite, the bite would nearly always be edge to edge, and there would be in that case a perfectly good molar occlusion, but by perseverance one could always got the child to close back into the original bite—using the term "bite" as indicating a static anatomical relationship of the lower jaw to the upper jaw, which occurred in mastication and which was practically, although not quite, the most posterior position which the mandible was capable of assuming. That normal bite, even although the attrition was well marked, could be still assumed by the child. The edge to edge bite was a functional condition due to the forward movement of the jaw in mastication. He did not think that actually there had been an alteration in the anatomical relationship of the mandible to the maxilla, as Mr. James would seem to suggest. With regard to eruption, he agreed fully with the paper Mr. James had quoted, but found it difficult to understand how one could get an insufficient vertical development of the molar teeth and yet have complete denudation occurring. It would appear, according to Mr. James, that there was an imperfect eruption of the teeth with regard to the bone, although denudation had gone on. He himself had seen many cases where denudation remained imperfect, as he believed it did nearly always in the case of the third molar, but he did not see how it was possible to get complete denudation and yet still have an imperfect relationship with regard to the bone. He would like to know whether Mr. James thought there had been an alteration in the relation of the condyle to the glenoid fossa. Did the relationship remain unaltered or did Mr. James think that the patient had assumed a functional bite of convenience, the anatomical bite still remaining and being assumed on occasion? He thought it was rather important, in connection with results which were obtained to determine really what had happened.

Mr. Friel said it had occurred to him that in two cases he had treated by jumping the bite he had done exactly what Mr. Pitts said, namely, he had got two bites, a bite where the child could bite forward with a beautiful result and a bite with a frightful result. In Tomes' Anatomy, the second edition, there was a jaw of the skull of a man who had a

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few upper incisors on one side and a few lower incisors in the lower jaw on the other side, and to get those few teeth to approximate he had to shift the jaw to the other side. He had a flat glenoid fossa. Possibly that was what he himself had produced and possibly what might be produced in some other cases of jumping the bite. He thought in treatment it was absolutely essential that a plate should be worn continuously before the proper condition could be obtained, and he would much prefer to fix a biting plane that was attached to the tooth and that the child should continuously bite in the one position shown in the model. The change that was going to occur was very large, and he thought it would have to be a very continuous bite if it was going to occur at all. Either the ascending ramus was going to change or the neck of the condyle or the bone that surrounded the joint. The joint itself was not likely to change. He had brought a model showing the biting plane used by Dr. Johnson in Boston. It was attached to the molars. Dr. Johnson made two upper molar bands and soldered two horizontal lingual tubes to the bands and fixed a longitudinal arch. To that lingual arch was soldered a small oval piece of wire with a flat surface, and the lower teeth had to bite on that plane. That allowed much more freedom than a biting plate; it did not interfere anything like so much with function and was much more constant. His great objection to the biting plate was that sometimes they were worn and sometimes they were not. With regard to the etiology, in his own practice the worst cases of close bites were not mouth breathers, and he thought it was quite true that they were never mouth breathers. He had two models of children of 4 years of age. The parents said that they were not mouth breathers, but they had very close bites. It was true that in the majority of cases there was distal relation of the jaws, and in those two cases the distal relation was on one side only. In actual treatment there was a difference between cases of mouth breathers and cases not produced by mouth breathing. In the latter cases one might obtain a result, but it was much more difficult to maintain it. In the case of mouth breathers the result could be obtained and maintained. Neither of the cases he showed had any protrusion, and they were not mouth breathers. In cases of mouth breathers he had found that the lip pressure was very reduced. He had been using an instrument by which he could measure the pressure of the lips, and in case of mouth breathers it was very much reduced, and in both of the children he had spoken of, the muscular pressure of the lips was quite good, almost a pound. In children who were mouth breathers it was very much less.

Mr. J. H. Badcock said that a great many years ago he used plates something like those Mr. James had described, with the inclined plane. He always used an inclined plane, with a metal surface, so that the teeth could slide upon it more easily. He found, as Mr. Friel had said, that two bites were obtained, and he came to the conclusion that the reason was that the biting plate only acted intermittently. It was not a question of leaving the plates out, which would make matters all the worse. If a plate were used like the one designed by Dr. Johnson, it was only effective while the teeth were clenched, which is seldom and for a short time only, so that an apparatus of that type was really acting only for a comparatively short period, the jaw working now in the forward now in the backward position. If one were aiming at an alteration in the glenoid fossa, some apparatus must be used which would keep the condyle in its forward position all the time, because if it were always sliding forwards and backwards a stable result could not be expected. Therefore he gave the method up some time ago. After conversation with Mr. James, he was stimulated to try it again, but he thought his results were much the same.

Mr. Friel said the apparatus of Dr. Johnson was only used for raising the bite, not as an inclined plane. It was not for bringing the jaw forward.

Mr. Keag thanked Mr. Warwick James for his paper and confessed that when he read the title he was greatly cheered, because close bite cases seemed to present an insoluble problem. When he read the summary of the paper he was disappointed, because it seemed to him that it was just a particular phase of close bite. As a matter of terminology he would not ordinarily have used the term for such cases, but one got into the habit of using Angle's

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terminology, and he thought he would call it a case of Class II. The essential feature of the cases presented by Mr. James was hardly a close bite but rather the postnormal occlusion of the lower teeth. His own preference in the treatment of such cases was for the Angle apparatus with modification—instead of the buccal arch in the lower or lingual arch. The result appeared to be the same eventually, although got by different means. The effect of the bite-plate and the Angle apparatus was two-fold. There was probably a reduction in length of the lower incisors as well as an elongation of the molars. Certainly there was a great deal of difference in the curve of the lower arch, which he thought was not entirely accounted for by the further eruption of the molars, but was accounted for in the bite-plate by the extra pressure on the lower incisors as well as the further eruption of the molars, and in the Angle apparatus the use of the lingual arch, the pull of the elastics on the lower molars transmitted through the lingual arch, was to depress the lower incisors and also to raise the lower molars. In view of the doubt which has been expressed as to the permanence of the results, he thought the Angle apparatus was preferable. By that means the bite was not jumped at all and the progress between postnormal occlusion and normal occlusion was steady. At the intermediate stage the bite was in between. It was only when the treatment had reached its conclusion that the normal bite, the bite which the child used in the great majority of occlusions, was the bite in which the incisors and molars came into what was regarded as normal occlusion. There was no doubt about the permanence of the normal bite when it was reached in that fashion with an Angle apparatus, and there certainly seemed to be some doubt of it when reached by the method of the bite-plate.

Mr. Housden said he noticed in one of Mr. James' models that there was a lower incisor missing in the front, and he would like to know whether that was due to regulating.

Mr. Samuel said there were several points in the paper which had puzzled him. As he understood Mr. James, one of the causes of what was usually called Angle Class II was a too close bite and it was said that that was most frequently found in mouth breathers. With regard to the question of treatment, he understood that one of the alternative treatments of Class II, Division I, cases, as given in most of the textbooks, was treatment by an inclined plane and opening the bite.

Mr. Sidney Spokes said he had been very interested not only in the paper but in the discussion, and had been also a little perplexed. He had tried to follow the various speakers in the different ways in which they diverged from Mr. James' paper, and they seemed to go very far afield. If the paper was taken without any of the frills which had been added to it, it was quite a simple thing. There was a bite with the lower incisors biting on the upper gum: leave the etiology out altogether and have regard simply to the treatment. A very old method of treatment was to raise the bite and give the molars an opportunity of rising, and he had seen it done over and over again. He quite agreed with one speaker that while the molars were coming up the lower incisors would be pushed down, but even that was not a disadvantage. He would content himself by saying that he could accept what Mr. James had put forward in the first place.

Mr. F. B. Bull said the question was whether the bite, when the case was finished, was a stable one. On one occasion when a child was asked to occlude, the bite appeared as shown in the finished model, and at other times, when the child was not being watched, there was a tendency for the jaw to be drawn back again. If the patient's bite was well forward, and that was not really the true bite, the muscles after a time would have a tendency to get tired, and if the child was asked whether those muscles ever did have a tired feeling it would be almost a solution to the mystery. He did not know whether Mr. James or anyone who had treated cases in that fashion had ever asked their patients the question.

Mr. Warwick James, in reply to the discussion, said he had certainly aroused some interest, if nothing else. He had read a great deal of what Dr. Sim Wallace had written, and it was always well worth reading. It was surprising how much Dr. Sim Wallace had taught orthodontists. With regard to the backward displacement, he had said in that paper that it could be called a backward displacement, but was probably more correctly described as a

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want of advancement, so that he should be in agreement with Dr. Sim Wallace there. He was sorry to claim to be the first person to regard the weight of the tissues upon the mandible as the factor which prevented that advancement, and he apologized for not having recognized that point in Dr. Sim Wallace's literature. Stimulation by gnawing was a point to which Dr. Sim Wallace attached great importance, and there was little doubt of its importance, but in these cases it was a fact that the jaws were apart rather than closed. The mandible was brought forward in order to gnaw. If the jaws were apart the weight of the tissues below acted upon it and tended to maintain it in a backward position. Mr. Pollitt had asked whether the plate was worn at night. The actual plate shown had no inclined plane upon it; it was used merely to open the bite to allow the temporary molars to rise. The child wore the plate night and day and during meals, and had no difficulty in using it; in fact, the child said he had the plate given to him because he was a good boy, and regretted very much giving it up. With regard to the use of the Badcock screw when capping the premolars, it was necessary to see that the expansion was not carried too far. He did not think it mattered a great deal if the teeth were a little overexpanded as long as they were not carried out far enough to lock outside those of the mandible. They would drop back quickly enough if given the opportunity. If expansion was unnecessary or only slight expansion was needed, a bite-plate alone could be put in and the molars allowed to rise. He was not dealing with the question of the correction of a general irregularity but merely talking of the use of a bite-plate in order to elevate the molars and get further development of them. It was quite true, as Mr. Pitts had said, that different bites could be assumed. It depended on the age of the patient. If the patient's joint was incomplete in development as when a commencement was made with a child of 2 years of age, the development of the temporo-mandibular joint could be influenced. Starting with a patient of 20 he had been able to raise the bite and get results.

If the maxillary arch was expanded and the molars allowed to develop, the mandibular arch could only occlude in the forward position and if the expansion were maintained the child would assume that position. All the teeth at first might not be occluding correctly but in due course they would do so if sufficient space was allowed for their development. It was necessary to maintain the maxillary arch, and in order to do that he let the children wear a vulcanite plate for several years, gradually dropping it, wearing it by night and not by day, or by day and not by night. It was necessary to maintain the position that had been attained, or the teeth went back, and that was why he thought the use of the inclined plane formerly failed. He did not think the capping of the premolars or temporary molars when an inclined plane was used formerly was done intentionally; he thought it was largely done by chance. By using an ordinary Coffin expansion plate in the case already described, the result was absolutely astounding. It was true that the mandible often had a great deal of movement if the patient was over 12 years of age when treatment was commenced, and that was why he urged that cases should be attempted at 2, 3 and 4 years of age, as soon as the temporary teeth were in position. It is quite possible that the eruption of the first permanent molars may become the ideal period to undertake treatment. He quite agreed with Dr. Sim Wallace that as soon as the temporary teeth were in position one could recognize the position that was going to be taken up, and he believed that treatment should then be attempted. With regard to Mr. Pitt's remarks on the subject of denudation and imperfect eruption, in his paper on eruption he pointed out that the tissues grew and that the teeth were carried with all the tissues into position, and that if a mouth was examined where the tissues would eventually be normal or even abnormal, the gum tissues were often in contact prior to eruption (see Fig. 2). The first permanent molars almost immediately they pierced the gum were very often actually in occlusion. He had seen cusps of opposing molars within a millimètre of one another at the time of actual eruption. In the process of eruption growth took place and carried the teeth with all the tissues upwards or downwards, as the case might be. Denudation continuing under such conditions would leave those teeth exposed, and if the occlusion occurred too early the teeth

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would be left in a position of insufficient development. With regard to the wearing of the plate, he told the patients that if the plate was not worn he would not go on with the treatment; that if they would not wear the plate, it was not the slightest use going on. He found patients would wear the plates and continue to wear them. Occasionally there was a case where a child would not, and then if treatment had to be gone on with, a fixed appliance should be used. He used a fixed appliance in some of the cases after he had raised the bite, possibly using a fixed appliance in the mandible and a vulcanite plate to keep the position in the maxilla. With regard to Angle's apparatus, it was the difficulty he had with patients that led him to adopt the vulcanite plate. There was always the difficulty of dealing with children who were going away to school, and he found the method he had described an exceedingly simple one, and he believed it would not be long before a great many orthodontists were using it, on account of its great helpfulness. It saved a long period of time during which the relationship of the molars could be altered, and then other apparatus could be used that involved more time and care. With regard to Mr. Samuel's remarks, it was perfectly true that the inclined plane was mentioned in the textbooks, and many dental surgeons had used it, but he thought the rather prolonged use he had adopted was a modification of the method. He had had no intention of reading a paper on the subject until he was more or less urged to do so, feeling that it was an important modification that might be discussed by the Society. He did not know how far the muscles became tired. The thing was to provide a bite that a child could adopt. With a vulcanite plate such as he used for a child of 2, in eating its food it could only bite on the plate, and the position was actually assumed. He did not attempt really to jump the bite, because he did not think jumping the bite was the correct treatment. He simply raised the bite allowing development of the molars in a vertical direction. Some of the cases were so bad that the protrusion of the upper incisors could be very unsightly and difficult to deal with, and in those cases he always used a rubber dam at night with the plate that he used for fixing, so that the teeth could be pulled back quite quickly. Very often the occlusion was fixed and the bite was open anteriorly, and in such cases he had extracted the first premolars and gone on pulling the teeth back until they dropped down on the lower incisors. The modifications that could be adopted with this particular method were numerous. If the bite was propped open, the teeth were protruding, the length of the face was altered and the incisors were pulled back until they came back on to the lower incisors. It was a fairly simple method. In hospital practice such a plate could be worn and the teeth corrected in that manner.

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SPRING ATTACHMENTS—POSITIVE AND OTHERWISE

By Dr. A. C. Gifford, Oshkosh, Wisconsin

WE WERE taught not many years ago that we had a universal appliance in what was known as the Angle arch, or the plain labial wire; but we have perceived through contact with different men, that this is an age of invention or mechanical ingenuity. The appliances now used by some men in the practice of orthodontics possibly give one more opportunity for modification than in previous times. I am referring to the lingual appliance in particular.

Much has been written in the last few years upon the spring of wires of minute gauge for the movement of teeth; especially so since the advent of the lingual wire, both stationary and removable. It is not to give you many new ideas that I present this for your approval, but to emphasize the value of these small wires when attached in such a manner that the "Elastic Forces" are still intact in these springs.

The lingual wire has been in use for many years as a retainer, and it is being perfected into an active appliance these last few years. Some use it as a soldered or stationary appliance, others as a removable apparatus.

The soldered or stationary wire is expanded or stretched with a special pair of wire-stretching pliers made only for nineteen-gauge wire. The peculiarity of this wire is its desire to move all the teeth, when being stretched, unless the technic that is adapted to this work is skilfully followed. One wrongly placed pinch of the wire will do much harm. Unless a definite technic has been followed, a surprise is sometimes in store for the operator upon the return of the patient the next time.

The removable lingual wire is adjusted differently; the plan being to follow the line of deformity as near as possible and straighten the bends which will press on these teeth in malposition.

Appliances of early construction show how they used to move teeth with spring wires, but there was no definite plan as to just how much pressure was needed, or how much force was necessary to place certain teeth in the desired place without disturbing the process and surrounding tissues, including the pulp of the tooth which was to be moved. So much force can be applied through the pressure of spring wires that great harm can be done both to tooth pulp and supporting structures.

It is very essential that what spring has been lost in the soldering should again be returned to these small wires in the magnitude of its proportions. Consequently these wires must be bent upon themselves after heating, for I find that they do not have the elasticity after soldering that they are supposed to possess. In certain cases one must protect the wire from heat as much as possible.

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There are great possibilities in this plan of moving teeth since we have the lingual wire with modifications, for it is possible to place attachments for tooth movement that will need no attention from the time they are placed until the tooth or teeth are in the position which we have planned they should be. This one factor makes spring wires a great favorite in my practice, especially when appliances are placed for patients who come from considerable distance. There is less adjusting and in fact the less you adjust or try to adjust these spring wires the more efficient the appliances will be, especially if the body wire is of the soldered or stationary type.

Each appliance must have a body wire, or a wire for attachment of springs, that is stable enough and large enough to take up all the action or reaction that may be put upon it by the draw, pull, or push of these springs; for if this is not the case our tooth attachments will suffer, and we have not only moved the tooth or teeth which we were trying to move, but our anchor-teeth as well. To place a spring upon smooth surfaces that are acclivous and declivous without some form of retention is not a good policy, for there will be that slipping or sliding of the spring to relax itself, particularly so if the spring be long. This retention may be on the body wire or on the teeth that have the pressure applied. There are many possibilities in the movement of teeth by this form of power.

When we consider this from an orthodontic sense it does not mean much, for the principles of nearly all appliances are that of spring wire, as there is in nearly all appliances this action that moves the tooth or teeth. In our plain labial wire, and the Angle pin and tube appliance, and the Ribbon arch, the spring is the principle of the force applied in these appliances to procure maximum efficiency. As near as I can explain, "spring" means "Elastic Power" in the sense in which I use it. We must use small springs in most cases. There are tooth movements however, that require a wire with considerable spring, especially if it is to be of extreme length. Therefore, the longer the spring wire the larger the size wire we must use.

What I have to present to you are cases in my practice that have been treated successfully with the appliances shown. I know there can be many modifications and alterations in these few cases that perhaps can be enlarged upon. I wish to impress upon you the use of the fine springs in preference to the heavy springs for they act better, and they continue to exert forces longer than heavy wire. Continuous light force or gentle elastic force is what is wanted for tooth movement, and adjustments will not have to be made as frequently.

There are numerous ways that springs may be attached to the body wire to move teeth. But many of the spring attachments will be valueless if they cannot be tightened correctly, and they, being always active, tend to destroy rather than correct. I have had many failures in trying to move teeth with springs for no other reason than that my principles were wrong in expecting each and every form of spring to move teeth.

When the force is applied correctly, one will be surprised at the remarkable results accomplished in a short time. A spring with a free end is not

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a positive spring in my hands, for in the tightening of this form of spring I find it will not keep its place, and the free end will slide up or down, as the circumstances are in either upper or lower, and be a continuous source of trouble. The tongue seems to be continually looking for some obstacle to disturb.

In many instances, I find it very inconvenient, as well as impractical, to use a body-wire that follows the gingiva of the teeth. Sometimes there is the occlusion that interferes in this respect, and ofttimes the appliance interferes with the speech if placed at the necks of the teeth. If we wish to place

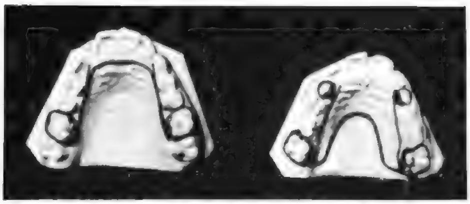

Fig. 1-*B*. Fig. 1-*A*.

Fig. 2-*A*.

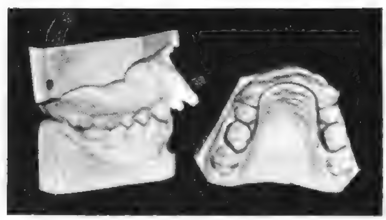

Fig. 2-*B*.

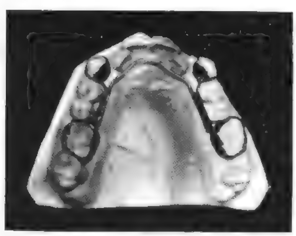

Fig. 3.

our appliances on the lingual aspect we must modify them according to conditions. Fig. 1 *A* will show my idea of such an appliance. It is a positive appliance inasmuch as the spring attachments are attached at both ends. The moving end is not necessarily soldered but may fit in under a wire or may enter a small tube one gauge larger than the diameter of the spring-wire used. Body-wire was 16-gauge, springs were 22-gauge. Fig. 1 *B* is an appliance made to perform the same duty as Fig. 1 *A*. This follows the line of the arch and does not have retention bands at the end of the spring wire. Body wire is 19-gauge, spring 22-gauge.

At this time I wish to call your attention to the curve or bent wire to the distal. The spring is soldered distally and bent upon itself to the mesial,

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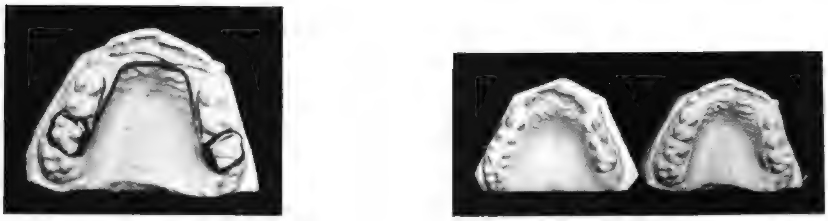
giving it more spring and a place for the tightening of said wire, which is done by a very slight bend to the lingual, at the cross, thereby bending the moving end labially.

The labial spring principle of the Hawley retainer has been used as an active appliance in my practice for some time. I find it a corrective appliance as well as a retaining appliance. My idea is that there is no better retainer than the appliance that is used to move the teeth. The spring can be applied as needed for the movement of teeth. These are shown in Fig. 2 *A*. The arch was expanded first, as is necessary in all these cases before this form of appliance was placed. Body wire was 19-gauge, labial spring 23-gauge positive spring.

Fig. 2 *B* is the same form of spring applied to a case where I thought



A. *B.* *C.*

Fig. 4.

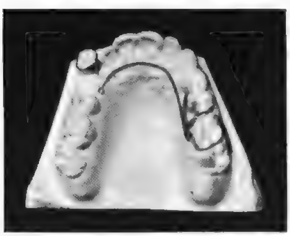


Fig. 5.

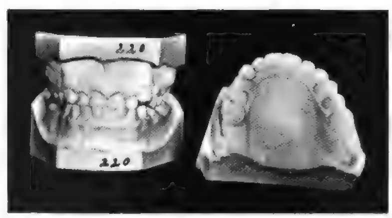


Fig. 6.

advisable to remove the first premolars. The first and second molars were used as anchorage, (this shows the retainer) and the body wire was placed only slightly to the lingual of the anterior teeth so as not to obstruct the speech, it being shortened occasionally. This form of spring is better used, I think, with a removable base-wire as it is easier to adjust, requiring less labor when shortening the body wire; wire same size as 2 *A*.

Fig. 3 is an appliance of heavy spring wire for the rapid widening of an arch where there is a marked nasal stenosis. Bands on molars and canines are fastened together by half-round wire (curved side to the teeth). A sixteen inside gauge open tubing, with the distal end closed is soldered to this wire connecting the teeth. A 16-gauge wire is fitted to this so it will spring and rest in these tubes. The 16-gauge wire cannot slide back if the distal end of the tube is closed. Considerable pressure was put upon the teeth which in one month's time showed a lateral movement of the canines and teeth distal

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to them a little over one quarter of an inch without an adjustment. This is a positive appliance.

Fig. 4 shows what can be accomplished in a very short time with the appliance shown. These springs all were made on the loop principle or bent upon themselves, so as to get an adjustable spring which would give constant pressure. The tooth movement was remarkable, as the model "C" was made about ten weeks after the appliance was adjusted and with but two visits to the office. Bands with small wires soldered to the linguo-gingival surface were placed on the laterals so the anterior springs would not slide to the occlusial. A 19-gauge body wire, and 22-gauge springs were used.

Sometimes, due to certain mutilated conditions, we are required to remove a tooth that is labially placed in the position of another tooth. The case number 5 had a mandibular right lateral removed some years previous to the time they consulted me for the correction of the misplaced canine.

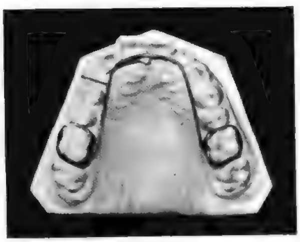

Fig. 7.

Fig. 8.

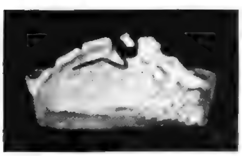

Fig. 9.

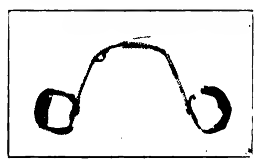

Fig. 10

I planned the appliance shown to give the most efficient services for a patient at a distal point from my office. After placing the appliance I saw the case but once until it was removed, and that only for observation. The appliance was not adjusted from the time it was placed until it was removed. Constant, positive spring pressure by a twenty-gauge wire placed the tooth where I planned it should be. Notice the stabilization of the molar anchorage. Spring wire of 20-gauge was used.

In cases such as Fig. 6 I find a very simple and efficient appliance such as is shown on the upper model. This is not very plain, due to it being a model made from an impression taken with the appliance in the mouth. The appliance was left as a retainer when the case was in normal occlusion. Body wire was 17-gauge, springs were 22-gauge.

Fig. 7 is a very ordinary spring appliance for the correction of the malalignment of the anterior teeth in the maxillary arch. A 19-gauge body wire and 23-gauge springs were used. Occasionally we are called upon to move

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one tooth to facilitate placing an artificial restoration and in one of such cases I constructed the appliance shown in Fig. 8.

Another delicate appliance is shown in Fig. 9. This is to rotate the lateral and was the original appliance used on this case and it surprised me to have the tooth in its normal position when the patient returned after about six weeks' absence.

In the early part of this article I spoke of retaining the free end of the spring wire on the body wire. Fig. 10 shows an appliance which has the free end of the labial spring in a tube, one size larger than the spring, soldered to the body wire. The spring wire must be bent at such an angle that it will slide freely in this tube as the tube is at an angle and is not parallel with the long axis of the bent spring.

There are many places where we can use springs in orthodontics and I hope to have some suggestions from the readers to add to my many spring ideas.

REPORT OF CASES*

BY GEO. W. GRIEVE, D.D.S., TORONTO, CANADA

THERE is nothing unusual in the case I am about to present, but it serves admirably the purpose of illustrating the efficiency of the pin appliance, which was used on the maxillary teeth. The mandibular arch was corrected with the lingual wire. It is a neutroclusion case.

Fig. 1 shows the extreme overbite, considerable space between the maxillary first incisors, lack of eruption of the maxillary right second premolar and maxillary left canine; the latter, as may be seen, was about to erupt quite high up. The skiagraph showed the presence of the premolar. There was no space for either of these teeth in the dental arch, and a great deal of bodily movement of many of the teeth was necessary in the correction of the case. Considerable intrusion of maxillary first incisors and all mandibular incisors was necessary, as well as some extrusion of both maxillary and mandibular premolars and molars.

In my experience, the pin appliance, with individual bite planes on the maxillary first incisor bands, is the ideal appliance for the correction of conditions as illustrated here in this maxillary arch.

When the finished models were made, the second molars had not yet fully erupted and the models teetered a little. To avoid an error of the photographer, in placing them to show the occlusion, little bits of wax were stuck on where the dark spots show on the occlusal surface of the mandibular model (Fig. 2). The occlusal aspect shows that, through an oversight, the maxillary right canine had not been fully rotated. The treatment of this case was commenced a few months before I started to use the half-round pin which our

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 26-30, 1921.

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good friend, Dr. Hawley, suggested to me. Rotations are handled with the greatest ease with the half-round pin, and orthodontists who are not availing themselves of this wonderful improvement in the pin appliance are missing a great deal of joy. I have no further use for a round pin, and am now much less liable to leave a tooth rotated.

The treatment of this case was commenced in November, 1916. The pin appliance was removed from the maxillary arch in July, 1920, and the lingual wire from the mandibular arch in April, 1921, when the final casts were made (Fig. 3).

Fig. 1.

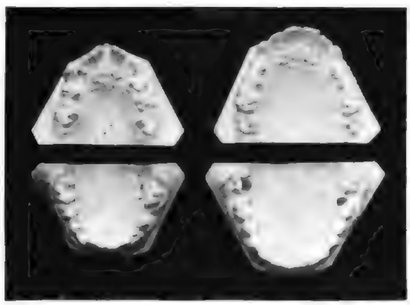

Fig. 2.

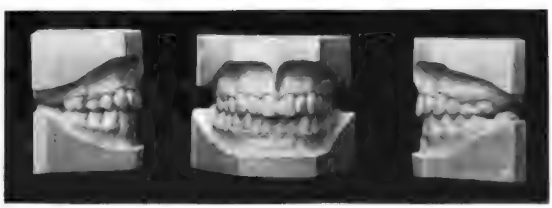

Fig. 3.

I am now using delicate springs a great deal with the pin appliance, half-round pins being soldered to the springs, and I find this adds very much to the efficiency of the appliance and shortens considerably the time of treatment. The more delicate application of force, too, makes it possible to allow the patients greater intervals between appointments.

There were no photographs taken of this patient, a boy thirteen years old, when treatment was commenced.

REPORT OF CLASS II CASE

The case which I desire to report is very similar to that just presented by Dr. Burrill, in that there was an abnormal inclination of the roots of both maxillary and mandibular incisors and also an excessive overbite (Fig. 4).

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The boy was twelve years of age when treatment was commenced in October, 1917. He had two habits—biting his nails and supporting his chin with his hand when sitting reading. He was also very lax in mastication.

. The pin appliance, with half-round pins, was used upon both maxillary and mandibular teeth from the commencement of treatment.

In this type of case it is now my practice, in most instances, to place individual bite planes upon the maxillary first incisor bands at the commencement of treatment. Locks are soldered to the wire to rest gingivally to the tubes on the first incisors, so that the force of occlusion upon the bite planes is delivered to all the teeth. If it is desired to depress maxillary first incisors there are no locks placed upon these teeth, and they thus receive the whole impact of the occlusion until such time as they have been carried to the

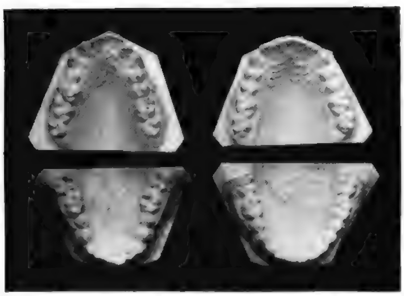

Fig. 5.

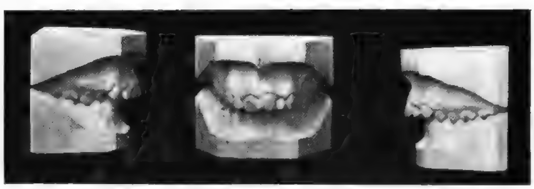

Fig. 4.

plane desired, then the locks are placed to distribute the force to all the teeth. In this case, bite planes were not placed at the beginning of treatment, as my technic at that time was somewhat different than now, but they were put on later.

Fig. 5 shows occlusal aspect of original and final casts.

There was some lack of forward development of the mandible, and it was necessary to carry all the teeth in the mandible bodily forward in the bone by means of intermaxillary elastics. The pin appliance is ideal for this work, and, by its use, the tipping labially of the mandibular incisors, as a result of the presence of the bite planes, can be prevented. The pin appliance upon the maxillary teeth also prevents the lingual tipping of the incisal ends of the teeth carrying the planes.

The forward development of the mandible and the general development of both jaws was obtained by means of the pterygoid and masticatory exercises, as suggested by Dr. Rogers, in addition to the action of the appliances.

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Dr. Hawley brought out an important point, namely, that a lack of proper width of the maxillary arch in the canine region will cause an interference which prevents the mandible getting far enough forward to permit of normal cusp relationship. Too much overbite and overeruption of both maxillary and mandibular canines have the same effect, and I believe many cases fail as a result of lack of detail in these respects. I intrude the canines where necessary.

In September, 1920, the pin appliance was removed from both maxillary and mandibular teeth. At this time a Hawley Bite Plate was placed on the

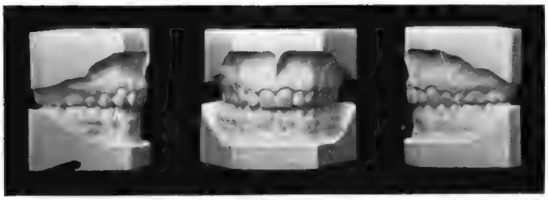

Fig. 6.

Fig. 7.

maxillary arch and a lingual wire on the mandibular arch. In December of the same year the bite plate broke and was discontinued, and in the following month the lingual wire was removed from the mandibular arch.

The final casts (Fig. 6) were made in April, 1921.

Fig. 7 shows the original and final photographs.

The pterygoid exercise has been discontinued and the patient cannot now close the teeth comfortably in any other relation than the normal.

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READINESS TO SERVE*

By Henry F. Hoffman, D.D.S., Denver, Colorado

In orthodontia, perhaps, more than in any other specialty in dentistry or in general practice, is the habit easily acquired of wasting the time of both patient and operator.

Time is the strongest argument against orthodontic treatment; the time used by the operator, the time consumed by the patient and the period of time covered to secure a complete result. The consumption of an unnecessary amount of actual time and the prolongation of the treatments over an unnecessary length of time results in increased expense to patient and operator, increased liability to dental and systemic disease and discouragement of the patient, all of which results are in time reflected in the mental attitude of the public toward orthodontic treatment, and can reasonably be attributed as the sole reason why treatment is not undertaken in many cases. Recognizing these facts should we not make every effort to conserve our own as well as our patient's time?

Conservation of time can best be accomplished by thorough preparation for work. By that I mean not only a familiarity with the various steps of the work, which every orthodontist is supposed to have, but a careful technic regarding the arrangement and preparation of the office equipment and materials. These should be so arranged that the various appliances and materials needed for the routine operations are so located that they can be reached with the minimum of effort and those most frequently used should be given the most convenient location. Everything should have its own individual place and should always be there. This arrangement should have the positive certainty which is indicative of the piano keyboard. The trained operator should know that with his eyes closed and without conscious effort he could place his hand on anything needed for his routine work. The air, gas, lights, heaters and the like should be so placed as to avoid unnecessary steps and movements. Offices equipped with two or more chairs should present exact duplication in equipment or the investment is largely wasted. This is also true even though there are individual operators for the several units. No one should be permitted to come into a systematized office and disturb that system.

I fear that this condition is not always found in the offices of orthodontists and dentists. The reason for the hit and miss arrangement so often seen can easily be understood. The habits of the college and the first years of practice are easily acquired and difficult to overcome. During that period we do not know accurately what will be needed for a given operation, we do not know the things most frequently used and perhaps have more instruments

*Read before the Rocky Mountain Society of Orthodontists, November 15, 1921

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than we know what to do with. In the order in which they are acquired instruments find a resting place where they are most easily disposed of, perhaps a new resting place every time they are used, but granting their location is permanent, that location is seldom selected with any consideration for being an aid to rapid operating. Often one drawer or compartment is the recipient of a loose, heterogeneous collection of instruments or materials many of which are used repeatedly during the day's work, yet the operator, each time he has to use one of these, has literally to paw over this collection to find what is wanted at the cost of mental confusion and loss of time.

So these habits growing unnoticed during the period when the operator's time is not fully occupied are frequently destined to become a lifelong handicap to rapid, efficient work. It is only the exceptional man who goes deliberately about a complete reorganization of his methods of work, for such reorganization requires application and conscious effort extending over a considerable period with the realization that this effort is itself temporarily costing considerable time and confusion. However, any amount of effort expended in a sane office reorganization is more than compensated for in the increased efficiency resulting.

Of late years we have heard a great deal about office efficiency, salesmanship, and the like but it must be admitted that most of this has been from the standpoint of making a charge for every minute of time consumed, much less attention than deserved being given to the equally important point of making every minute of that time of the greatest value to the patient.

By being prepared to do in the minimum of time any routine operation without special preparation for that one operation many of the emergency needs of the patient can be supplied at the time they present without the necessity for a special appointment, otherwise necessary, thereby conserving the time of the operator and bringing the treatments to an earlier termination.

The minute a band, a spring, a spur, or anything of the sort is needed and not supplied at that time, the termination of the case is delayed, yet how often is such a simple act put off merely because it takes too long to light the gas, fix the air valve, find the right pliers, the right size wire, a piece of solder and get the dirt out of the flux, all of which should require about as much time as does the telling of it.

Often more time is consumed in making an appointment than should be required for the particular part of the operation for which the appointment is made.

The mental attitude of the operator who works under favorable conditions, who knows where everything is and that everything is there, who knows what everything is for and how to use it, is quickly reflected in the responsiveness of the patient to the work.

Some professional men equip themselves for everything but their work. They are wonderful entertainers, they can keep anything from a four year old child to a ninety-nine year old corpse occupied for an unlimited time and get nothing done. It may be put down as a general rule that our patients, in-

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cluding the children, soon notice and become very appreciative of our efforts to conserve their time.

The operator who has mastered the art of working under favorable conditions finds himself accomplishing more work with less effort and wonders what he used to do with his time. Readiness to perform our work with a minimum of time and effort produces better results, eliminates unnecessary overhead, makes our work available to more people, and creates a feeling of confidence in the public mind which nothing else can do.

DENTITION AS A NORMAL PHYSIOLOGIC PROCESS*

By Henry Heiman, M.D., New York

"Doctor, my baby is ill. He must be teething." This is almost a universal cry. It is uttered by the lips of thousands of mothers to thousands of physicians in a thousand different places.

Every disease to which infancy is susceptible has been attributed to the eruption of teeth. Fevers, "colds," bronchitis, influenza, measles, infantile paralysis, disturbances of stomach and intestines have all at one time or another been considered the result of teething.

It is surprising how many intelligent college-bred women give this cause as the explanation of their infants' ailments. Even more surprising to learn is that a goodly proportion of physicians still cling to this remnant of medical superstition.

It is quite time we discarded this legend. The eruption of teeth is a perfectly normal and natural process. "Teething" is not a disease, nor is it responsible for any disease or symptom. The growth of teeth does not produce fever, pain, cough, vomiting, diarrhea or convulsions. It is easily understood why mothers persist in attributing to teething these various diseases. They often occur at about the same age as dentition and it is easier for doctors to agree than disagree and explain. The diagnosis of teething at times permits diseases to develop beyond the stage where they can be controlled.

Dr. Holt says, "The doctor who starts out with the idea that in infants dentition may produce all symptoms usually gets no further than this in his etiologic investigations."

For the last twenty-five years on no history chart in our institution does a diagnosis of "teething" appear. In thirty-four years no paper on teething as a disease has been presented before the American Pediatric Society.

Dentition is a physiologic condition similar to the growth of nails or hair. It would be ridiculous to refer to "hairing" and "nailing" as afflictions of infancy.

You are all doubtless familiar with the development of the teeth. I

*Read before The Scientific Section of Oral Surgery of The First District Dental Society, March 1, 1922. Publication rights reserved by author.

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shall give but a brief outline here. As early as the thirty-fourth to the fortieth day of intrauterine life when the embryo is twelve to fifteen mm. long the first sign of tooth formation appears. This is an ingrowth of the deeper layers of the epithelium of the mouth forming a band, part of which becomes the dental lamina. Upon this, small thickenings or buds make their appearance where teeth are to be formed. These thickened portions develop down into the submucous tissue producing a cap over the mesodermic dental papilla and form the enamel organ of the milk teeth. The dentine germ, in the form of a papilla, then arises from the mesoderm and fills up the concavity of the enamel organ. Prolongation upward of the lower and lateral margins of the dentine germ, surrounding the enamel organ and meeting over its upper surface, form the tooth sac. The cement and periodental membrane are formed from the tooth sac. The permanent tooth is formed from the continuation of the original dental lamina or tooth band. The first traces of calcification appear about the twentieth week of intrauterine life. At birth the sacs of the first permanent molars and those of all the temporary teeth are completely developed. The crowns of the temporary incisors and one cusp of the first permanent molars are calcified.

The eruption of the teeth is a normal physiologic process. The tissue overlying the tooth becomes gradually more attenuated and absorbed. There have been a number of theories regarding the process by which this occurs.

J. Howard Mummery summarizes the most recent opinions: "It seems impossible to deny that there is a forward movement of the tooth in eruption which is probably due to many causes such as: the elongation of the roots, the growth of the bone of the jaw, the development of the periodental membrane and the blood pressure in the vascular tissues around and beneath it.

"This advancement of the tooth is therefore probably due to several concomitant forces and is one factor in eruption, the other being the absorption and opening out of the tissues overlying the tooth."

Swollen gums do not exist in the natural process of teething. Before the tooth appears the gums surrounding become more prominent. This is not at all an abnormal condition. It does not produce pain, fever, or any other disturbance. A reddened, swollen gum, sometimes hemorrhagic, indicates a gingivitis which is not infrequently associated with a stomatitis, or scurvy.

The pain which sometimes accompanies the development of the so-called "wisdom" tooth is due to its peculiar position. This latter is produced by the changing configuration of the jaw of the Caucasian race during the process of evolution from an oblique angle to a right or perhaps eventually an acute angle. There is evidence too in the wisdom tooth or third molar of a rudimentary development. The fang is curved and grooved indicating traces of a subdivision into three fangs. This evolutionary process does not affect the eruption of babies' teeth in any manner whatsoever.

A common belief is that drooling is caused by dentition. This is not true. It occurs very commonly at the same period but from an entirely different source. It indicates that the three salivary glands have become active. This is essential for the digestion of starchy food.

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Very frequently a mother will tell us her baby is teething because he keeps his fingers in his mouth. Well, where else should he keep them.

The time of eruption of the teeth is dependent on three main factors: first, the individual constitution, second, the food intake and third, the metabolism.

We cannot control the individual constitution. In Cretinism, which is a disease of infancy due to thyroid insufficiency, dentition is considerably delayed. The metabolic rate is very much diminished.

In rickets, which is usually caused by improper food intake, dentition is retarded.

The late appearance of the teeth, however, does not mean difficult dentition. What are the therapeutic measures to be applied regarding dentition? Several methods have been used, some of which unquestionably should be discarded. A very bad practice, not uncommonly employed, is to rub the gums. This does not in any case promote the growth or influence the eruption of the teeth. Interference of this kind can only do harm by causing irritation and inflammation. Could rubbing the scalp influence the growth of hair? If so, this is valuable information for many of us.

Cutting the gums is a pernicious practice. Such a procedure can only retard the eruption of the teeth. A scar may be formed, the gums will be thickened and dentition then becomes difficult indeed.

There is but one way to aid Nature: furnish the proper food. Normal breast milk is perfect. It contains all the necessary ingredients including the salts of potassium, magnesium, calcium, sodium, iron, iodine, sulphur, phosphorus, chlorine. With artificial feeding the addition of fruit juices is of great value.

Let us then no longer consider the eruption of teeth as a disease or cause of disease but a normal physiologic process.

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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IMPACTED TEETH AND THEIR RELATIONSHIP TO CHRONIC SYSTEMIC DISORDERS

BY MATTHEW F. EUSTERMAN, D.D.S.

Fellow in Dental Surgery, The Mayo Foundation, Rochester, Minn.

NINE thousand five hundred sixty-four patients were referred to the Dental Department of the Mayo Clinic for full mouth roentgenograms between June 3 and December 15, 1921. The examinations were made in the department as part of the routine of physical examination or in a definite search for foci

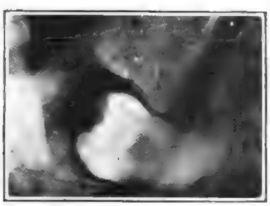

Fig. 1.—Impaction with infection of mandibular right third molar.

Fig. 2.—Impactions with infection of mandibular right second and third molars.

of infection. The tentative physical diagnoses or the chief complaint was indicated on the patient's refer card. Approximately 8 per cent of the patients in this group had impacted and unerupted teeth that required removal. The data in the tabulation pertain to the number and type of impactions, and the various unerupted teeth that might be factors in the cause of disease.

It is difficult to determine the relationship of unerupted and impacted teeth to systemic disorders. According to the literature, affections of the

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eye, ear, and brain are very often relieved by the removal of impacted teeth. In such instances the malposition of the teeth have caused trophic disturbances, and in some, damage by way of the blood stream. Their relationship, therefore, to such systemic disorders is brought about by direct pressure or reflex stimuli on nerves, and by way of the blood stream owing to the infection they harbor.

Impacted and unerupted teeth are not easily differentiated. It is assumed that the unerupted teeth referred to in this paper under ordinary circum-

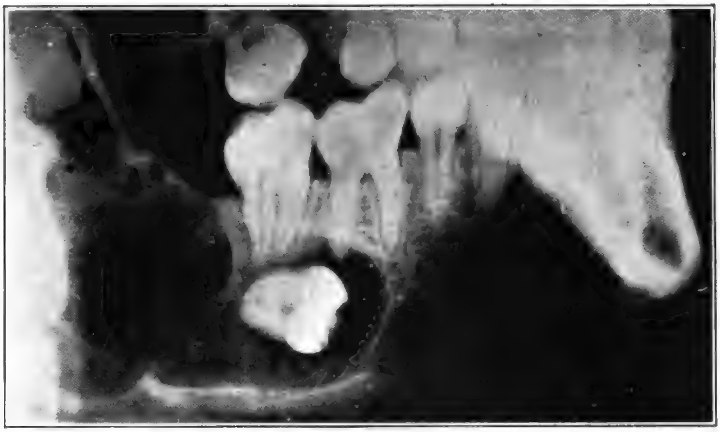

Fig. 3.—Encysted, imbedded mandibular left third molar after an attempt at removal.

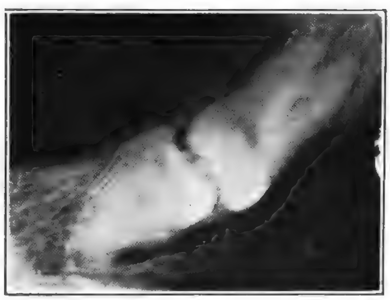

Fig. 4.—Impactions without infection of mandibular right second and third molars.

stances would have taken their proper places in the dental arch, if it had not been for the reduced vitality of the patient or some nutritional disturbance intervening at the age these teeth ordinarily erupt. Impacted teeth are those whose development and eruption are impeded by displacement of the tooth-bud or tooth, by increased density of bone surrounding them, or by deflection by tissues that have become fibrous. Positive impacted teeth are those that require removal. Negative impactions are those that are allowed to remain. Mechanically impacted teeth are not included in the series.

The various data obtained in the study of this series of cases, and particularly the relief to patients with systemic disorder of having positive

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impacted teeth removed, convinces me that the part impacted teeth play in causing disease is more often hematogenous than trophic.

Figs. 1, 2, and 3, disclose impacted teeth with infection and Fig. 4 discloses impactions without infection. The inevitable shadow around such teeth is not infrequently attributed to pathologic processes; minute lesions are regarded too often as shadows due to malposition. Data concerning history, palpation, and uncontaminated cultures should be factors in cases in which there is doubt as to whether or not such teeth should be removed.

The tabulated data given is an indication that impacted and unerupted teeth as factors in systemic disorders may play a conspicuous part by way of the blood stream and not infrequently by their direct pressure on nerves or reflex stimuli.

TABLE I

IMPACTED AND UNERUPTED TEETH	
Patients	9564
Patients with positive impacted teeth	699
Patients with negative impacted teeth	65
Average age of patients	34
Positive impacted teeth	1063
Negative impacted teeth	129
TYPE OF POSITIVE IMPACTED TEETH	
Maxillary left third molars	195
Maxillary right third molars	208
Mandibular left third molars	263
Mandibular right third molars	265
Maxillary left canines	56
Maxillary right canines	54
Mandibular left canines	3
Mandibular right canines	2
Mandibular right first premolars	2
Mandibular right second premolars	4
Mandibular left second premolars	1
Maxillary left first premolars	1
Maxillary right first premolars	1
Maxillary right second premolars	1
Maxillary left centrals	2
Maxillary right central	1
Maxillary left first molar	1
Maxillary left second molar	1
Maxillary right second molar	1
Mandibular right first molar	1

CHIEF SYSTEMIC COMPLAINT OF PATIENTS WITH POSITIVE IMPACTED TEETH	Patients
Poor general condition	89
Arthritis	76
Gastric disorders	76
Lesions of kidney and bladder	50
Neuritis and myositis	47
Headaches	28
Backaches	27
Diseases of the gallbladder	21
Diseases of the heart	15
Diseases of the nose and throat	14
Diseases of the skin	13
Syphilis	9
Anemia	9
Tuberculosis	9
Diseases of the ear	8
Diseases of the eye	9
Epileptiform seizures	8

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SUMMARY

1. Approximately 8 per cent of 9564 patients had impacted teeth.

2. Approximately 90 per cent of the impacted teeth required removal either as a prophylactic measure, because of their position or because of the infection they harbored.

3. Forty-nine per cent of positive impactions were of mandibular third molars, 35 per cent were of maxillary third molars, 10 per cent were of maxillary canines.

4. Impacted canines are usually found in pairs.

5. Impacted teeth are not, in the main, associated with general disorders.

6. Clinical observation and the pathologic findings make it evident that the part impacted teeth play in causing disease is more often hematogenous than by direct pressure or reflex stimuli on nerves.

7. The number and kinds of impactions demand consideration of the displacement-bud theory in the development and eruption of such teeth.

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DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

PROFESSIONAL RADIOGRAPHY VS. COMMERCIAL RADIOGRAPHY

By Dr. F. J. Collar, Alameda, Cal.

DR. HOWARD RAPER, author of the standard text book on radiography established the term radiodontist for a professional man required to have a license to practice dentistry the same as an orthodontist, prosthodontist, or exodontist, but who specializes in radiography. This class is represented by the newly organized American Society of Dental Radiographers.

The radiographer, on the other hand, is simply a technician who has developed the necessary procedure for making radiograms the same as the photographer makes a photograph. He is not required to have a license. He has not been trained in the studies of anatomy, pathology, bacteriology and modern methods of sterilization. He is not able to recognize the symptoms of the various contagious diseases which are prevalent and he is handling all classes and races of people who might be carriers of almost every disease known to men. This class is represented by the California Association of Radiographers.

A history of the origin of one of the commercial x-ray laboratories is a repetition of almost all of them. One of the leading dental supply salesmen of Los Angeles foresaw the commercial possibilities of the x-ray game, as he terms it, and procured the necessary financial backing to equip an x-ray laboratory. On account of his intimate acquaintance and friendship with a large percentage of the dentists, he immediately had a large following as soon as he sent out his announcements and price lists. His technical knowledge of the x-ray, he acquired from selling x-ray machines. His knowledge of pathology, histology, methods of sterilization, diseases and anatomy, he learned while walking the streets and visiting dental offices. He is no longer a hard working dental salesman but after a few years of operating his laboratory, he is the owner of an orange grove and remarked recently, that if they hold off dental legislation governing x-ray laboratories for another year, he will not care what they do, for he can retire.

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Bearing on this subject some startling statements are made in a letter from Dr. James McCoy of Los Angeles, author of Dental and Oral Radiography, and shows to what extent commercial radiographers have usurped this branch of dentistry in some sections of the country. His letter, in part, reads as follows:

"Dear Doctor: In reply to your letter of February 9, relative to dentists in this section capable of contributing to the program of the American Society of Dental Radiographers, I wish to say that to my definite knowledge we have none here. This is a sad acknowledgment and I can give you a very definite reason for the existence of such a condition, to wit: The lay radiographer has so monopolized the field of dental and oral radiography in this section that capable, educated dentists do not feel like entering into competition with them. We have any number of these men conducting dental picture galleries here. Personally, I know they have no legal or moral right to do this work and they should not receive the support of the profession and do not receive the support of the better element. The possibility of the Southern California Dental Association ever endorsing the lay radiographer in any form, is exceedingly remote."

We spend a great deal of time and energy discussing legislation and education of the dental hygienist who polishes the exposed surface of the teeth under our personal supervision; all of which is working out very satisfactorily, then for various reasons we shut our eyes to the most important and dangerous branch of dental practice in sending patients to commercial laboratories. My intentions are not to indulge in personalities, but to call attention to some of our shortcomings and inconsistencies in forgetting all our duties and obligations as professional men in our effort to develop radiographic technic.

The importance of radiography in oral diagnosis and dental operations has reached a degree where the modern practice of dentistry cannot be conducted without it. The extensive utility of radiography may be truthfully described as being an aid to the performance of all operations except the polishing of teeth and the treatment of superficial caries. However, the dental profession has not generally adopted radiographic examinations to the extent they should be applied for the greatest operating facilities and the most efficient service. Dentists are prone to seek the assistance of radiography only when complications arise instead of using it as a routine procedure to prevent complications. This may be due to a lack of appreciation of its innumerable advantages or a lack of knowledge in employing it to the greatest advantage. A similar condition would exist in any branch of practice which had been given as little technical consideration and serious study. When dentists believe that the chief factor in radiography is the machine and get their instructions from a salesman, they should not expect to get the maximum benefit from its use in practice.

If cleaning the exposed surfaces of the teeth, involving no danger of life to patient or operator is lawfully a dental operation, is the placing of a dental film in the mouth and making the exposure involving grave dangers to

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both patient and operator, less a dental operation? We, as dentists, limit our practice to certain classes and races of people which automatically eliminates a large percentage of disease and we take every advantage of modern methods of sterilization to protect ourselves and our patients. Then we send them to these commercial x-ray laboratories where they are compelled to take their turn in this "melting pot" of human diseases. Some dentists have tried doing their own radiography and have concluded that it was not a paying proposition. Others have the mistaken idea that they are too busy to do this branch of dentistry. It is the busiest dentist who should do his own radiography for he can conserve his time and increase his efficiency, and at the end of the day he will find that he has accomplished a great deal more and has been able to give his patient better service than he could if he had to stop in the middle of his operation and send his patient to a laboratory and, as many do, depend upon the laboratory to interpret the film for him.

Dr. O. E. Lamphear in a paper on "The Radiogram and Its Interpretations," read before the Michigan State Dental Society says, "The diagnosis is not taken from the film except in rare cases, but is made up from many factors, interpretation of the film, the clinical and laboratory findings, etc."

A definite order of routine in classifying cases, combined with trained analytical judgment in interpretation, careful checking with the history chart, which was taken before radiographing the subject, will build up ability that enhances the value of the opinion of any radiodontist sufficient to make it very much worth while professionally, provided he has followed his case to the operating chair.

Does the radiogram show any variations from the standard normal, abnormal growth, or the cause of lesions? Do they appear to give any symptoms regarding the patient's case? Are the radiographic findings corroborative of the laboratory findings? Do the radiographer's findings agree with the physical findings? Does anything in either suggest a solution of the other? Do they agree with the findings of the clinician or internist?

Dr. Pollia in a recent article states: "To attempt to recognize a carcinoma of the stomach microscopically without having a mental picture of the normal epithelial layer is not commendable to say the least; yet, the number who attempt to read radiograms and point out the pathologic variations and still are unable to describe or definitely state the normal, is appalling. The very fact that the study of the attributes of normal alveolar process seen in the radiogram has been neglected, explains why many teeth which are actually diseased, with diseased perialveolar bone tissue, have been overlooked much to the patient's detriment. On the other hand, many pulpless teeth having nothing but the projection of a foramen at the apices, have been extracted much to the patient's loss, and the dentist's silent anguish." In speaking of bone conditions, he says, "Let me repeat that radiographically it is impossible to differentiate from the changes in the affected structure itself, which of these influences is operating. This is determined by other means, such as the location of the lesion in relation to the root, the presence or absence of dental interference, history, clinical examination, etc."

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In the July number of the *Pacific Dental Gazette*, you will find published Dr. Howerd Raper's list of 83 possible mistakes that can be made in the interpretation of dental radiograms. I would suggest that you read this list over and decide for yourself, how many of these mistakes the commercial radiographer could recognize.

Albert H. Stephens, in a paper read before the National Dental Association in Boston in 1920, says, "I will particularly emphasize the menace of dental diagnostic work as carried on in some industrial clinics where there is no fixed responsibility. The taking and interpreting of dental radiograms requires diagnostic ability only acquired by experience and is too important a phase of dental service to be performed at these clinics. It was to prevent irresponsible dentistry, that the law of New York State was amended to prohibit corporation dentistry, so in our zeal for public service we should not endorse a return to another form of corporation dentistry with its old abuses."

Some years ago we in California spent a great deal of time, money and energy passing laws prohibiting the practice of corporation dentistry in the state of California, and almost before the laws went into effect, we permitted corporations to practice one of the most important branches of dentistry and open branch x-ray laboratories throughout the country like a string of Chauncey Wright Restaurants or Piggly-Wiggly Groceterias. It is true that we have injected some of our professional knowledge into these laboratories, but in so doing we are sliding down the scale of professional standards and all will soon be on the level with the commercial laboratory with all its evils and abuses.

I have a little pamphlet here entitled "The Prostitution of Radiography." This is very interesting for reasons which will be seen when I state some of its contents. It tells many of the evils and dangers of the commercial laboratories, some of which I have mentioned, and many more which we all know exist.

"Many states have laws which make it necessary for those practicing dentistry, or conducting (dental parlors) or advertising offices, to use their own names, but, regardless of this, x-ray laboratories are allowed to exist and solicit business from the profession without using any individual's name.

"Much has been written on the paying of commissions; still x-ray laboratories openly advertise such facts. Even though we disapprove of the paying of commissions, we must confess respect for the laboratory that is bold enough to advertise its plan, and not do as some dental and medical men do; namely, condemn the practice openly and be a party to it privately."

In summing up this article which has caused so much comment, we note the following facts:

1. "That from the lack of knowledge of the tissue involved the radiologist is unable to diagnose radiograms. (Our laboratories have graduate dentists, physicians and pathologists make the diagnosis.)"

2. "That from the lack of professional ethics the standard of dentistry will surely be lowered. (Our laboratories are owned and controlled by den-

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tists who have and are doing a great deal for dentistry and are manned by officers or ex-officers of the City, State and National Dental Association.)"

3. "That by the lack of knowledge of hygiene and antisepsis there is a great danger of infecting patients in taking radiograms. (Our laboratories sterilize their films and take every precaution to prevent infection.)"

"(If you wish to raise the standard of dentistry, patronize our laboratories.)"

In regard to the ethics of this work, I shall quote some extracts from the constitution and by-laws of the American Roentgen Ray Society, which has been in existence for over twenty-two years.

"A. The roentgenologist, being a consulting diagnostician, should reveal his findings only to the attending physician or surgeon who has referred the case to him, and not to the patient, except by the specific request or permission of such attending physician or surgeon.

"B. It shall be unethical to claim *superiority in diagnosis* or treatment due to some secret method, or apparatus, *improvement in existing methods,* or apparatus, held to be known to the claimant.

"C. It shall be considered unethical to advertise by circulating either the medical or the laity, with price lists, description of office facilities, etc.

"D. It should be considered unwise (1st) to accept as a patient anyone not sent by a reputable physician or surgeon; (2nd) To provide the patient or his relatives with plates or prints taken for diagnostic purposes."

Do you know of any x-ray laboratories that are not violating these by-laws which are the same standard which we professional men try to uphold?

Dr. Alonzo C. Tenny, President of the Chicago Radiological Association, says: "My opinion is that after January 1st, the elimination of fee splitting, rebating and corrupt methods will be accomplished and laboratories owned and operated by those who are not registered physicians or dentists in the state of Illinois will be unable to secure a license to operate in Chicago."

Dr. Clarence O. Simpson of St. Louis, in a lecture before the Chicago Dental Society, offers some suggestions which are good food for thought. Speaking of x-ray laboratories he says: "Although the situation is lamentable, it is only temporary and entirely remediable. Every state has laws regulating the practice of dentistry, which, if enforced, would put a ban upon unlicensed and incompetent *x-ray operators at once.* The function of dental boards is to safeguard the oral health of the people in the respective states, but their activities suggest a desire to protect the dental profession rather than the public, since their procedure is carefully studied to win the favor of a majority of the profession in the states. If the Chicago Dental Society and the St. Louis Dental Society should pass resolutions condemning the laxity in restriction of radiodontic practice, and demand a strict enforcement of laws, the state boards of Dental Examiners in Illinois and Missouri would doubtless be alarmed until they could call a special session to conform.

"Why have the advertising dental parlors no standing with the pro-

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fession? We are told it is because they did not fulfill advertized promises. The service rendered was inferior; they advertized operations at fees lower than adequate service could be rendered; and they operated under fake firm names instead of licensed individuals. The dental x-ray laboratories do all of these things but continue to prey upon the people unmolested.

"Commercial x-ray laboratories are tolerated because the discriminating portion of the dental profession knows little about them and ignores them; while the 'penny grafting' portion utilizes them to capitalize the fear of the ignorant by replacing questionable teeth with unquestionably septic bridges, performing absurd surgical (?) operations, and in many instances exacting tainted tribute from the laboratories by 'fee splitting, accepting commissions and dividends.' These laboratories could not exist without the connivance of dentists, and would be eliminated if all dentists refused to accept films from an unlicensed operator, an incompetent operator, or one not conducting a practice in conformity to the recognized standard of service and ethics in other specialties.

"There are marked indications of improvement in that the leading reputable dental journals will not accept advertizing from commercial laboratories and official action has been taken in some localities to restrain dentists from receiving commissions for referring patients. When more knowledge and discrimination are applied to radiographic diagnosis after dentists have been repeatedly misled in diagnosis and subsequent procedure, and a large portion of the laity have become victims of inferior and dishonest radiography, a much higher standard of practice will be required and established."

Unless you have followed the evolutions of radiography for the past few years you do not realize what has taken place here in California or what the possible results will be. Among the members of the California Association of Radiographers, there are a few very illustrious exceptions, not typical representatives of the men who exploit commercial radiography. These men have made a study of gross anatomy and pathology and have developed wonderful technic enabling them to give interpretation which is a great assistance to members of both the medical and dental profession. These exceptions have developed in all professions during their evolution before they were regulated by law. Four years ago I had a lengthy discussion with one of these men who at the time expressed himself very emphatically about the danger of radiography if practiced by unlicensed operators. His ideal for the future of radiography at that time was that it should be a separate branch of science the same as dentistry, medicine or pharmacy with state laws governing that particular branch. Since then great progress has been made in that direction by the *organization* of an association of radiographers, and now I understand that they have the endorsement of the medical society and are attempting to get the endorsement of the dental society both here and in Southern California. Their object is to pass laws limiting practice of radiography, which, if put into effect, would prohibit you who are now doing your own radiography from doing it without passing an examination and securing a license.

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This is a serious situation which needs our immediate attention and co-operation: Are we going to sit idle and allow the commercial radiographer to not only take away from us some of our most important branches of dentistry, but to dictate as to what our requirements should be in order to practice radiography; or should we join forces with the American Society of Dental Radiographers and by our united efforts endeavor to keep radiography where it rightfully belongs?

PLACING AND HOLDING FILMS IN THE MOUTH

(PART I: GENERAL CONSIDERATIONS. PART II: TECHNIC BY REGIONS.)

BY HOWARD R. RAPER, D.D.S., INDIANAPOLIS AND ALBUQUERQUE

(Continued from the June issue.)

PART II. TECHNIC BY REGIONS

WE shall now take up the technic of placing and holding films, by regions so to speak. We shall consider placing the film in the various regions for a 12-film radiodontic survey. (See Figs. 13, 14, and 15.)

I suggest that the reader read the legends under the illustrations to learn the details in technic for the various regions. The regions are taken up in the following order:

Mandibular incisor region, Figs. 16 to 19 inclusive.

Mandibular canine and premolar region, Figs. 20 to 24 inclusive.

Mandibular molar region, Figs. 25 to 27B inclusive.

Maxillary incisor region, Figs. 28 to 31 inclusive.

Maxillary canine region, Figs. 32 to 35 inclusive.

Maxillary premolar (and first molar) region, Figs. 36 to 37 inclusive.

Maxillary molar region, Figs. 38 to 41 inclusive.

(For illustrations see following pages and August issue.)

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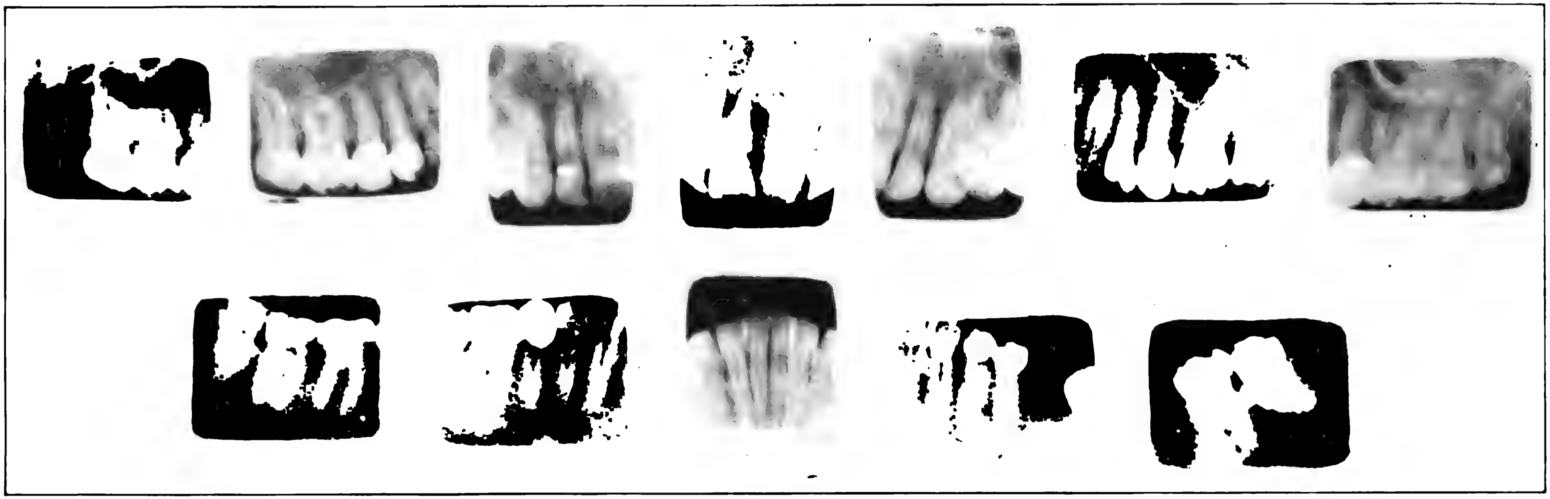

Fig. 13.—A 12-negative radiographic survey of the mouth. Holder No. 1 was used for all the maxillary teeth. For the mandibular teeth, No. 3 for the incisors and No. 2 for the others.

The advantages of using 7 instead of 5 or 6 films for the maxillary teeth are: (1) We get a much better view of the anterior teeth. When only 5 films are used we sometimes fail to get a good radiographic view of one or more of the incisors. When 6 films are used, two films are used for the incisors, a central and lateral on each. The central lateral combination is a fair one, but the anterior palatine foramen sometimes falls at the apex of a central; this makes diagnosis more difficult. (2) When 7 films are used for the maxillary teeth, it is not necessary to put the canine and premolars on the same film. This is advantageous because the correct vertico-horizontal angle for the canine is higher than the best angle for the premolars. (3) The film which gets the premolars includes the first molar also, and usually the second. Thus when we make another negative of the molar region, we can make it at a slightly different mesio-distal angle. This is very advantageous; we can throw the shadow of the malar bone and process first distally (when the premolars are included) then mesially in the next exposure. Maxillary molars are difficult to radiograph; with the two views, what one radiograph does not show the other may.

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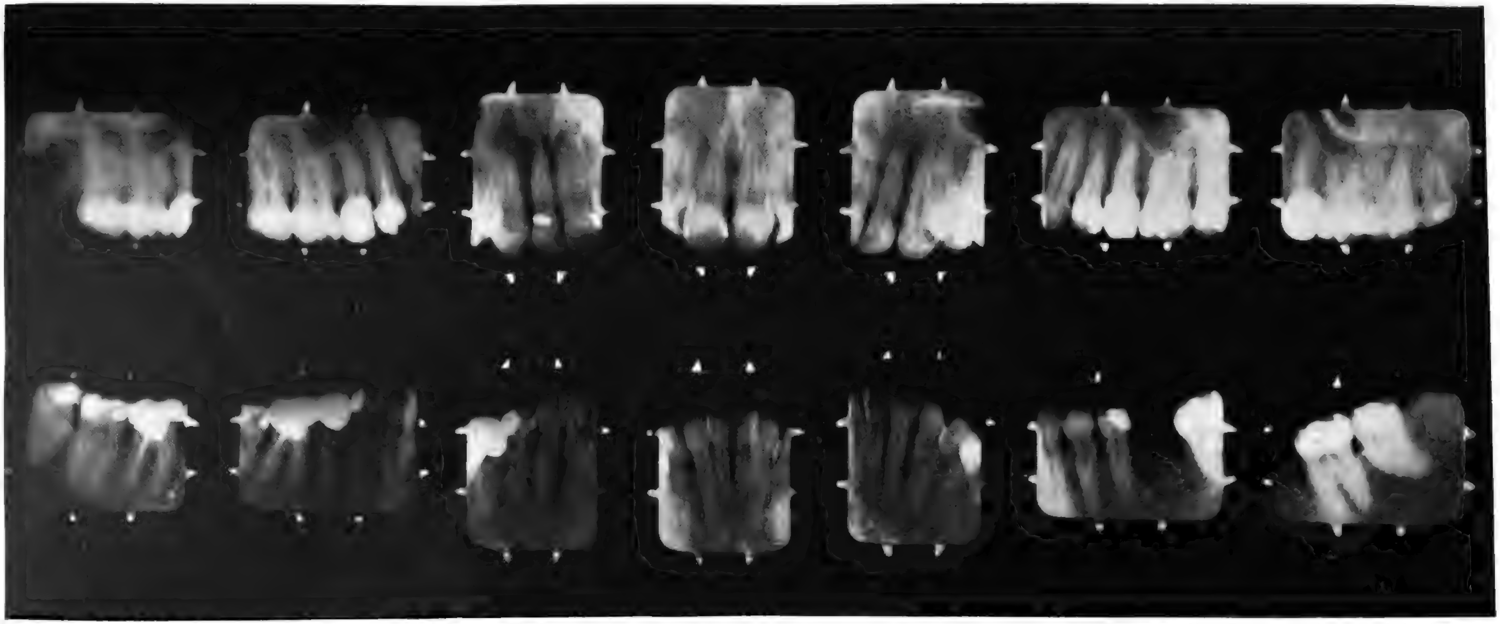

Fig. 14.—A 14-negative examination has distinct advantage over a 12-negative examination in that the examination of the mandibular teeth is more thorough. When only 5 films are used for the mandibular teeth, the radiographic view of the mandibular anterior teeth is not always as good as it should be and sometimes one fails to get a good view of all of the molars.

The original radiographic survey of the mouth, whether it be a 10- or a 14-film survey "is the beginning, not the end," of a radiodontic examination. However, fewer additional negatives need be added when the original survey is a 14-film one. Sometimes a 14-film survey will give an excellent view of all parts of the mouth. Less frequently a 12-film survey will give a good radiographic view of all parts of the mouth. The 10- or 11-film surveys practically never give a good radiographic view of all parts of the mouth.

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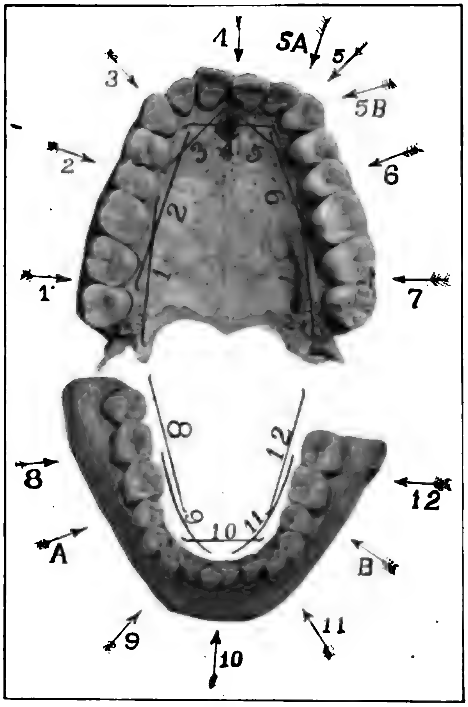

Fig. 15.—The line to the lingual of the teeth indicates the approximate position of the films for a 12-film mouth examination (see Fig. 13). The arrows indicate the mesio-distal angle. For the 14-film survey 7 films are used for the mandibular teeth as well as the maxillary teeth. The lines *A* and *B* indicate the mesio-distal angle for the additional films when 7 films are used for the mandibular teeth.

Mandibular Incisor Region

Fig. 16.—Mandibular incisor region. Bending the film for the mandibular incisor region. This illustration shows one side already bent and the other being bent back.

Fig. 17.—Mandibular incisor region. Putting the film packet (held in the film holder) in place.

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Fig. 18.—Mandibular incisor region. Showing the film holder held in place in the patient's mouth. (The black paper of the film packet has been retouched to make it show plainer against the dark background of the patient's open mouth.)

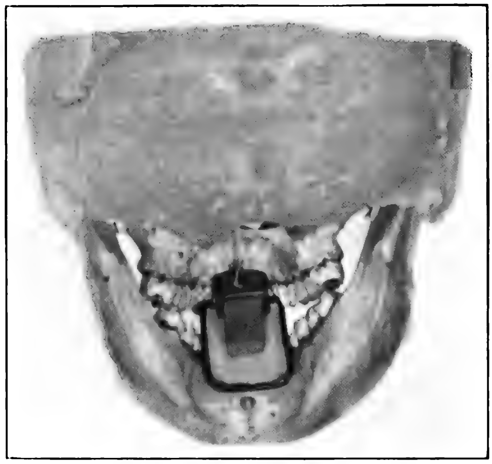

Fig. 19.—Mandibular incisor region. Lingual view of the film packet held in position. (Holder No. 3 for this region.)

Mandibular Canine and Premolar Region

Fig. 20.

Fig. 21.

Figs. 20 and 21.—Mandibular canine and premolar region. The film packet is being bent for the mandibular right canine and premolar region. First it is bent as illustrated in Fig. 20, then the front and back lower corners are bent also, Fig. 21.

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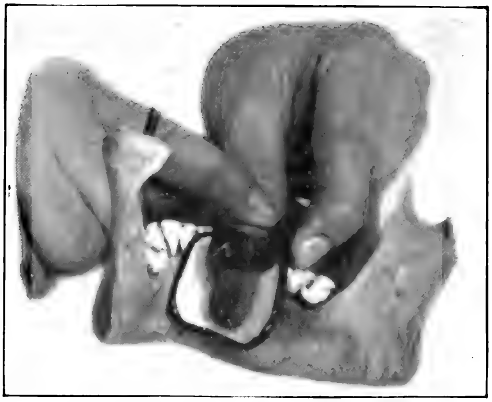

Fig. 22.—Mandibular canine and premolar region. The film packet (held in the film holder) placed in position.

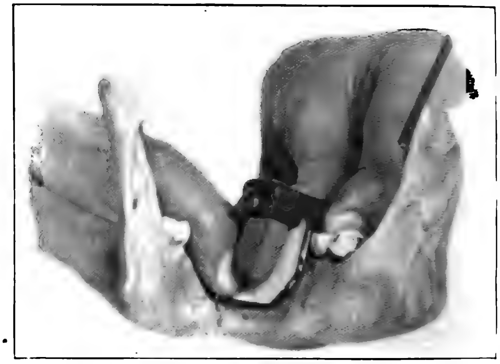

Fig. 23.—Mandibular canine and premolar region. Showing the index finger assisting in adapting the film packet to place.

Fig. 24.—Mandibular canine and premolar region. Lingual view of the film packet held in place. (Holders Nos. 1 or 2 used for this region.)

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Mandibular Molar Region

Fig. 25.—Mandibular molar region. The film packet has been bent for the mandibular right molar region. Not much bending is necessary for this region. The lower front and back and the upper back corners are all bent *slightly*.

Fig. 26.—Mandibular molar region. Lingual view of the film packet held in place. (Holders No. 1 or No. 2 for this region.)

Fig. 27-*A*.

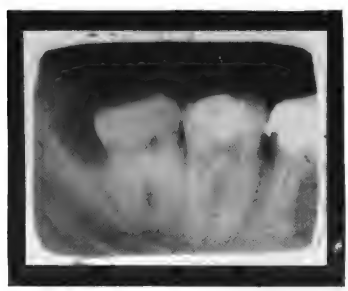

Fig. 27-*B*.

Figs. 27-*A* and 27-*B*.—Fig. 27-*A* was made with holder No. 1. Fig. 27-*B* was made with holder No. 3. Note that holder No. 3 holds the film so that it shows the tissues above and back of the third molar.

(*To be continued in August issue*)

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Radiolucence Elucidated

Q.—Is it necessary to extract the lower second molar and curette the rarefied area under it to remove the possibility of infection? This case is my wife and I believe the teeth are vital, but I want to leave nothing undone to improve her health.

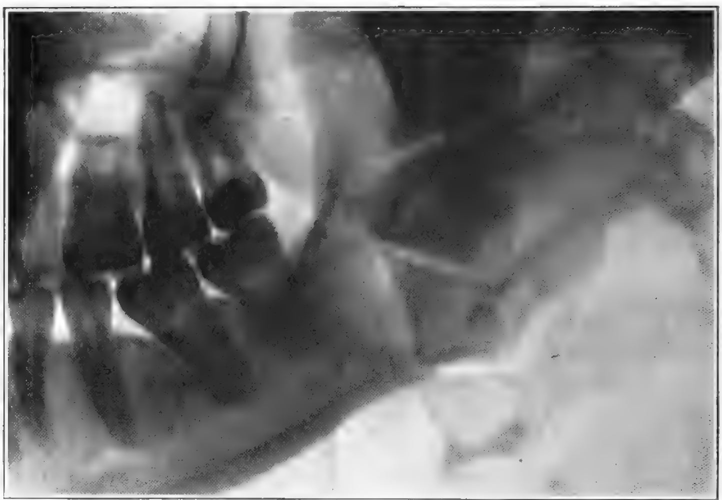

Fig. 1.

A.—From the radiographic evidence, the possibility of infection from this region can be excluded without removal of the teeth, or curettage of the bone. Apparently this is a typical radiolucent area due to irregular calcification and a large medullary space so often present in the mandible. These marked structural variations are commonly mistaken for diseased areas, and sufficient emphasis by description and illustration has not been given to them in text books dealing with interpretation.

Usually there is a distinct difference in the radiographic records of pathologic destruction, and normal radiolucent areas. However, the size, form, and degree of radiolucence are not the marks of differentiation. Anatomic variations may appear suspicious in location, size, and circumscribed outline, and

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much darker than most diseased areas. An extensive and careful study of negatives develops a fine discernment which quickly detects pathologic changes and reduces the number of mistakes from structural diversities. If a description will convey the conception, the early changes from osteoclasia by periapical disease presents on the film a blurred, partially erased appearance with a reduced range of tones between high lights and shadows, and a tendency toward a spherical form. In distinction, normal inequalities in density show the delicate trabeculae sharply outlined and the relative contrast evident although the general shade key may be low or dark. The

Fig. 2.

Fig. 3.

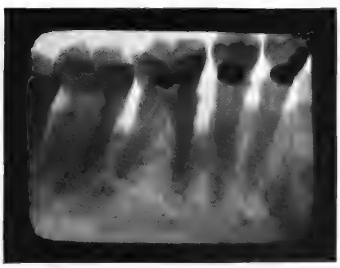

Fig. 4.

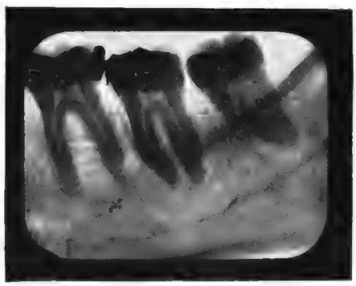

Fig. 5.

Figs. 2, 3, 4, and 5.—Illustrations of typical radiolucent areas in the mandible, indicating large medullary spaces instead of disease.

lamina dura is a significant detail to be considered in this connection. Although there is a remote possibility of metastatic involvement or an obscured break in the dense wall of the alveolus, if the lamina dura can be traced intact around the roots of the teeth it is presumptive evidence that rodiolucence is not the result of chronic disease. This feature of interpretation is conclusive argument for rigid technical requirements in radiodontic examinations. Only by efficient equipment, careful technic, and the exclusion of all elements of fallacy, can mistakes be avoided and the ultimate development of radiodiagnosis be attained. In this case you should have had a more thorough x-ray examination to aid you. Extraoral examinations are rarely adequate in deciding questions of this nature, and should be verified by intraoral films of all questionable regions.

Regenerated bone following destruction by disease or removal of teeth

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is quite likely to vary from adjacent structure in having some large medullary spaces. This condition has led the disciples of lucrative curettage to outrage nature by the excavation of many healthy jaws, and which Dr. F. B. Moorhead has aptly termed "meddlesome surgery." If one is not the prospective subject, it is amusing to hear one of these "miner" surgeons rave over the dangerous areas in radiograms of edentulous regions, all of which to his distorted vision appear like sections of imported Swiss cheese. Excepting cysts, there are extremely few alveolar involvements which do not repair without surgical treatment after extraction of the teeth, and there is a characteristic aspect to septic crypts unlikely to be confused with harmless discrepancies in calcification by unbiased observers.

For Home and Country

Q.—Is there great danger of becoming sterile from ordinary use of an x-ray machine? I have only had a machine two years, but I believe it is affecting me.

A.—All glandular tissue is highly sensitive to x-radiation, and sterility can be produced in either sex by moderate exposure. (This must not be misapplied in attempted birth control because it may react as a chastening boomerang in producing the effect by removing the cause.) The cumulative effect from the unprotected operation of x-ray equipment has resulted in temporary sterility, but in view of present knowledge and means of protection it would be considered gross negligence. It is probable that the exposed skin of the face and hands would be noticeably affected by injudicious exposure before less accessible organs, and doubtless you are unnecessarily alarmed.

If there is any doubt about your protective methods, a simple test will decide the question. With adhesive tape attach a coin to the front of a film packet facing the tube, in the location you occupy when exposures are made. If you operate the control from behind a screen, place the test packet back of the lead glass window because it is less radiopaque than the lead lined screen. If upon development the test films show the outline of the coin after one week's exposure to average operating, you are absorbing a dangerous radiation. In case the result of this test is negative, a similar one should be made for a month to insure safety over a period of years. Should either of the tests result in fogging of the film, additional protection should be provided.

The most important precaution is not to hold the films for the patient, or direct the primary rays through the cone toward yourself. Have your equipment so arranged that the cone is always directed from you when the tube is energized. Have the tube enclosed in a lead glass shield, because there is sufficient secondary radiation emitted from the back of the tube to disclose the bones of the hand through a fluoroscope. With the bowl type of shields fitted to separate tube stands, beware of the unenclosed back and the notch for the cathode end of the tube. Through the latter opening, primary rays escape which will quickly fog films at a distance of ten feet. When operating stand as far from the tube as convenience will permit, remembering that scattered radiation arises from the patient and all objects in range of the

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rays. This action is especially marked in a dental operating room with the usual metal accessories near.

A lead lined screen or door offers the greatest degree of protection of the customary methods. When placed a few steps distant or preferably just inside an adjoining room, the lead glass window is the only questionable element of safety, but the use of a screen is effective only as one remains behind it while the tube is active. If the operator reaches beyond it for the controls or habitually grasps the edge of the screen with the hand, the exposed parts derive no benefit from the protection.

Vigilance must be maintained for the safety of other operators and assistants in the office. A tile wall is ample defense from ordinary radiation, but wood or glass partitions offer slight obstruction to the rays. The office arrangement often provides less protection for associates than the radiographer, by the primary rays being directed toward a secretary's desk or an-

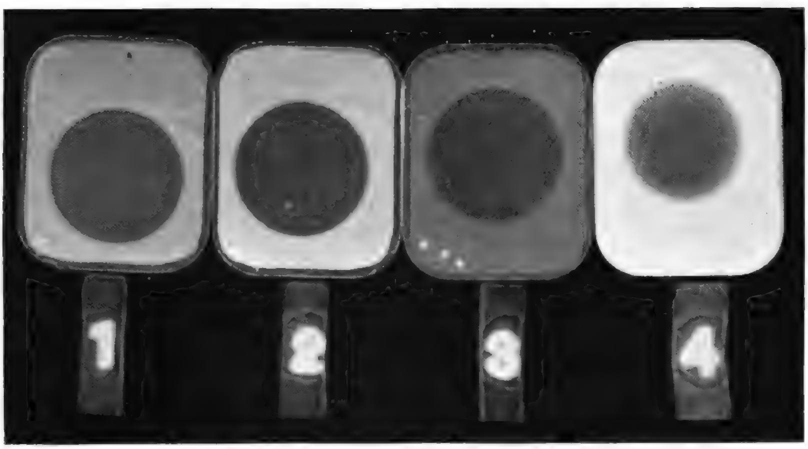

Fig. 6.—Tests of secondary and stray radiation. *1*, Film with coin attached protected from the primary rays but exposed to secondary radiation from wood 6 inches from the film. *2*, Radiographic image of coin produced by secondary rays from sheet steel 6 inches distant. *3*, The result of secondary radiation from sheet lead 6 inches distant. *4*, Radiogram of a coin by primary rays through an oak door 1 inch thick, two feet from the tube. A 30-second exposure was given in each test.

other operator beyond a light partition. A glaring example of criminal carelessness was that of a dentist who stated that he avoided the danger of injury by having his assistant hold the films for the patient. Assume such risks as you choose, but do not unscrupulously impose them upon some one who is ignorant of the danger, even if you are afflicted with the migratory species of assistants who do not remain long enough to either learn or "burn."

A microscopic examination will determine your present propagation status, and azoospermia or limited motility from radiation will probably be corrected by avoiding future exposure. Quite likely you are confusing sterility with impaired function or declining propensities, and charging x-rays with that which age and prodigality are responsible. The x-ray explanation for baldness and race suicide is more romantic than accurate, and however pardonable in sustaining domestic felicity should not result in self-deception.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

On the Danger of Pulpless Teeth for the Organism. E. Becker (Greifswald) Correspondenzblatt fur Zahnarzte, January, 1922, xxxxviii, 1.

This article is announced to be in part a criticism of some views expressed by Professor Fischer, the Cincinnati physiologist. The modern doctrine of a subacute or chronic dental sepsis causing infection of remote organs began with the Englishman Hunter about 1905, although since restricted very largely to American authors. Some years later Billings and Duke each wrote on the subject and the term focal infection came into general use. A flood of contributions has since appeared and one of the latest, by Martin Fischer (in 1921), has been translated into German. Germany during the past seven years has been more or less out of touch with American literature, so that the author feels handicapped in his account of the subject. But enough has reached Germany to make a number of converts to the theory of focal infection as a prolific cause of disease. The fallacy of this theory lies in the neglect to take into account the defensive forces of the economy. If the menace were what is claimed for it odontigenic arthritis would be one of the most common affections. A careful analysis of morbid material will show that only isolated cases of so-called focal infection occur, the majority being vitiated by errors of observation and reasoning. Focal infection has little in common with acute sepsis originating in the alveoli, tonsils and other localities in which we see metastatic lesions of vital organs and very frequently death from sepsis or pyemia. The author criticizes the type of case reported as focal infection. He quotes several without comment, implying that they refute themselves without any outside aid. In conclusion he quotes one American authority who states that the peak of the focal infection craze has been passed and that pulpless teeth are no longer a bugbear in medicine.

Pulpotomy. Editorial, Dental Items of Interest, February, 1922, xliv, 2.

The editor first calls attention to the indifference of many dentists when in attendance at congresses as to what they term "highbrow stuff". The latter

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apparently includes all histology and pathologic anatomy in general. When papers on these subjects are on the program, certain members slip out to play Kelly pool or other game. But now and then the highbrow paper proves to contain something of vital importance for every day practice. Studies by Dr. Clyde Davis in the current number of the journal are of this type. Nominally they have to do with the formation of secondary cementum, but the question comes up of the optimum amputation of the living pulp, which according to Davis should be somewhere near the apex. The placing of the filling close to the amputated pulp stump will do away with the protrusion of gutta percha which is condemned by a number of progressive dentists. Dr. Davis is candid enough to admit that the question has not reached the final stage. The editor emphasizes the spontaneous natural defense of all tissues against injury from without or within; and in the case of death of the pulp this defense naturally consists in the formation of secondary cementum. Realization of this fact is of great importance for dental practice. It is assumed at the outset that no secondary cementum will be laid down in the presence of an infected pericementum. When the secondary cementum has been laid down the pulp will be found uninfected. There remains for consideration any condition in which the cementum has not yet formed but may form in the future. If the canal is empty beyond the partial root filling, as shown by repeated x-raying, the indication is to refill; but if the apex of the tooth appears to be solidified it should be let alone. The operation of unfilling and refilling is hazardous. In other cases already mentioned in which pulpotomy is indicated it must be borne in mind that the indication is not primarily to save the pulp, but to avoid injuring the pericementum.

On the Connection Between Joint Affections and Dental Disease. E. Plate (Hamburg) Zahnaerztliche Rundschau, March 3, 1922, xxxi, 8.

The author ascribes the recent interest among German dentists in this disease association to the translation into German of Professor Fischer's work on oral sepsis ("On infection of the buccal cavity and systemic disease"). On his first perusal of this work the author thought the case indubitably proved, but having subsequently taken up the subject with an experienced pathologic anatomist he has in part reversed his opinion although giving Fischer and his translator credit for attracting general attention to this subject, which is clearly a most difficult one to judge. To go back to an older subject—that of tonsillar infection of the general organism—we find the same difficulty and the same source of fallacy. In alleged infections of this nature the regional lymphnodes should be swollen but if we study the cases we will often find that this swelling was not in evidence. Whenever pathogenic germs have been taken up by the lymphatics it is the business of these glands as the first or at least second line of defense to show a defense reaction. Again in these cases bacteriologic proofs are completely lacking. The offending organisms should in theory be isolated and cultivated and inoculated successfully into laboratory animals. Instead we are to accept the evidence of x-ray shadows of alleged apical granulomata. On the other hand the treatment test cannot be ignored, and because

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so many cases of joint and other affections have improved after procedures which sterilize the alveoli, the author in his brief summary admits that not a few cases of joint affections are of probable dental origin.

Proprietary Rights of the Patient. V. Jonas (Breslau). Zahnaerztliche Rundschau, January 31, 1922, xxxi, 5.

It occurs in the practice of every dentist that discarded crowns and pieces of bridge-work, as well as plates, are left behind by the patient. These may contain considerable gold and platinum and evidently the patient, perhaps while more or less excited, has merely neglected to take them along, and fails to mention that he does not care to keep them. After a reasonable delay the dentist throws them out, of course after salvaging the metals, which are incorporated with his regular stock. This experience is so common and widely spread that the dentist grows accustomed to it and after a time it will never occur to him that some of the patients might have continued to regard the articles in question as their personal property. There is often the question put to the dentist "can these crowns, etc., be utilized for further work?"; or perhaps the patient asks if he is entitled to any credit for the discarded gold. It is possible and proper to look at these questions from the strictly business angle. If the dentist states that the metal cannot be used again and the patient walk out without claiming his property, it is still legally his. On receiving a statement for a course of work the patient may ask if he has been credited with the discarded metal and in such a case the dentist should give a fully itemized statement, including credits if the patient is entitled to them. If in this connection the patient demand that the old metal be given him the dentist must comply. According to the laws portable property belongs to the original owner for 30 years. In case of a dispute with a client the latter may incidentally make a claim to property left behind years before. A case is given in which after a long interval a patient demanded a gold crown back. This happens continually. The dentist must give back the crown if he still has it; if not he must give another or the equivalent in money. If the man failed to pay for the extraction the dentist will still have to give him back the difference.

Fatal Sepsis From a Bit of Straw in a Root Canal. Guttmann (Heydekrug). Zahnaerztliche Rundschau, March 10, 1922, xxxi, 9.

On September 19, 1919 the author was consulted by a man of 37 years who requested the removal of a root. There was but little swelling and tenderness and no fluctuation, but the lymphnodes on both sides were somewhat swollen and there was a temperature. The pulse was small and rapid and the skin of the face showed a slight icteric hue. Three days before there had been a chill, and the jaws became partly locked, so that only liquid nourishment could be taken. The breath was very fetid. The only dental find was absence of the crown of the third left lower molar, with the roots slightly loosened in the alveolus and much overgrown by the gum. Caries had destroyed the entire tooth to the roots. The mouth was forcibly opened by a gag and held in this

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position by a wedge, while with root forceps of proper curve the two roots were extracted. There was no escape of pus with the blood. No relief followed such as usually follows extraction in alveolar abscess. The extraction was done without anesthesia of any kind. There was no after-treatment, as no evidence of pent-up pus was forthcoming. In the mesial root was a bit of match wood and in the distal a bit of straw which may have been in position for 18 months, at which time patients had begun to use such objects to cleanse the cavity. In both roots the apices were necrotic and both were involved above in the carious process. Suppuration about the roots had evidently occurred repeatedly and finally a blind abscess had formed in the depth of the alveolus. Necrosis of the apex was the outcome of the alveolitis. The straw fragment appears to have inoculated the blood with the gangrenous infected tissue at the apex. The time of this infection was about ten days before extraction.

As the man was clearly in a septic condition he was sent to the district physician for treatment but did not go, perhaps because of a certain amount of relief experienced after extraction. Three days later chills reappeared and he sought the author again. He was hardly able to stand and was markedly icteric. The glands in the neck were greatly swollen but such was the apathy of the patient that he complained of nothing save pains in the chest and difficult breathing. He was interned in the district hospital with diagnosis of severe sepsis, and was given a single intravenous injection of colloidal silver. Then, ill as he was he managed to leave the hospital for his home. Three days after this experience the wife reported the death of the patient and as autopsy was refused, the exact mechanism of the death must be conjectural. Death had occurred five days after the extraction.

Radiography of the Cranium and Face. H. Josse (Paris). Journal de Radiologie et d'Electrologie, December, 1921, v, 12.

The article includes a paragraph on radiography of the maxillae. That of the superior maxilla is of course merged in radiography of the face and profile, and this is also true of the inferior maxilla. When one desires to obtain a radiograph limited to a portion of a maxilla, two methods may be employed according as the plate to be impressioned is to be within or outside the mouth. If the former the tube always remains horizontal and one so disposes that the part of the maxilla to be investigated rests upon the plate. A stand with variable opening should be used and the head given the proper rotation, while a cork should be maintained between the dental arches. In this way one will almost always succeed in avoiding the projection of that half of the jaw turned toward the anticathode upon the part to be examined. One allows the normal ray to pass either between the cervical column and the angle of the lower jaw, at the level of the temporomaxillary articulation, or, more rarely, below the branch of the lower jaw which is closest to the anticathode. One may thus obtain excellent results and especially when one takes the precaution to place the radiogenic focus as near as possible to the head in order to avoid the side of the maxilla opposite the plate. The intrabuccal method is well developed by the Americans and in France by Belot.

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EDITORIALS

The F. A. C. D.

OCCASIONALLY we see in print following the name of some dentist, the letters "F.A.C.D.," meaning "Fellow of the American College of Dentists." There has been nothing in the dental profession that has been shrouded with so much mystery or has evoked so much criticism as the American College of Dentists.

We are informed that the American College of Dentists is an organization that was patterned after the American College of Surgeons, and the American College of Physicians. The value of the Fellowship of the American College of Dentists, depends, of course, upon the authority or standing of the organization granting that distinction. The dental profession, as a whole, knows very little about the American College of Dentists. The first information

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obtained was from a small news article which appeared in the daily papers of Boston during the meeting of the National Dental Association in that city. It was stated that a certain group of men had organized the American College of Dentists. As we remember, three or four men were mentioned as organizers of the College, but the purpose and function was not clearly defined in the news article and is little understood by the profession today.

The dental profession as a whole adopted the plan of patiently waiting for more information in regard to why and what the American College of Dentists was, and about the only information they obtained was the occasional appearance in print of another name followed by "F.A.C.D."

The next question that arose and which we have heard asked many times was: How or why has this individual obtained an F.A.C.D.? Perhaps some of the criticism has originated from men who thought they should have an F.A.C.D., but some has been made in the spirit of constructive criticism and an honest attempt to obtain information.

It is our belief that it was the intention of the founders of the American College of Dentists to start an organization which would eventually render a definite service to dentistry by stimulating research work and urging men, particularly younger men, to pay greater attention to scientific investigations. In fact practically all that has been published relative to the American College of Dentists is found in the November, 1921 issue of the *National Dental Journal.* There is an article by Dr. C. N. Johnson entitled "Educational Ideals in Accordance with the Aspirations of the American College of Dentists."

There was also an item giving a brief history of the American College of Dentists and its scope, in which it is stated that the Fellowship would be conferred upon two groups of practitioners. The first group consists of "those members of the profession who have been at least ten years engaged in the practice of dentistry, whose efforts during that time have been loyally devoted to its advancement, and who are unquestionably looked upon as leaders in their respective communities. Time and effort devoted to teaching in dental schools, to presenting papers or clinics before dental societies, or to organization and executive work of a constructive character, as well as public services or civic duties, having a tendency to enlarge the usefulness or the public appreciation of dentistry, shall be taken into consideration when passing upon candidates of this group."

By the careful reading of these qualifications for membership in the first group, you will see that it takes in everybody in the profession and lays particular stress on "organization and executive work of a constructive character." This paragraph is one which from a scientific standpoint is extremely misleading because it allows everyone with political influence to become eligible for membership regardless of what he has done of a professional or scientific nature.

In considering the second group, we read that "the conferring of the Fellowship shall be held out as a stimulus to young men to induce them to engage more earnestly in those activities which tend to advance dentistry as

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a profession and for which monetary remuneration must necessarily be sadly out of proportion to the time and effort expended. Devotion to teaching, especially to the nonclinical branches, to research work and to public education; as well as advanced work in the art, science or literature of dentistry, should be greatly encouraged as a consequence of this movement.''

This second paragraph outlines the most laudable purpose of the American College of Dentists. In fact, if only this group of possibilities had been created, the American College of Dentists would have served a much better purpose.

After reading the purpose of the American College of Dentists as outlined, we fail to find any qualification for the Fellowship or any outline of work which must be done that will enable a young man to obtain the F.A.C.D.

The American College of Surgeons and the American College of Physicians have a definite set of qualifications which a young man or practitioner must fulfill, and have a plan whereby he can make a statement to the Board of Censors or Directors that he is going to do a certain amount of work and upon the completion of this work will be a candidate for the Fellowship. We believe the American College of Dentists should have a similar definite proposition to offer the young man and not such a vague plan as exists in their qualifications for the membership as outlined in the article published in the *National Dental Journal* of November, 1921.

We are perfectly aware of the fact that any attempt made towards the raising of the standing of the dental profession or towards perfecting an organization, the object of which would be the granting of a Fellowship for recognized and meritorious work will be open to criticism. We also realize that some one in the profession would have to start such an organization, but we are indeed sorry that the organizers of the American College of Dentists have made one error which seems to be almost inexcusable. We know of the plan whereby the American College of Dentists was organized by an original committee of four which later selected twenty-five men to assist them in perfecting the organization, after which we believe, twenty-five more men were selected because of their fitness and geographical location.

For the four men who started the American College of Dentists we have no personal criticism. They are undoubtedly leaders in the dental profession. All of them are known to us and we respect and revere them. Some of the twenty-five selected by this committee of four are also known to us. However, we believe the original committee, as well as the twenty-five selected, made a very serious mistake when they granted the Fellowship to themselves. This committee of four which called the organization together have done wonderful work for dentistry, but they would have gone down in history much more revered and respected if they had been content to have been known as the organizers of the American College of Dentists without having given the Fellowship to themselves. The greatest criticism that has been made by men in the profession is that the founders of the American College of Dentists granted Fellowships to themselves and that the original twenty-five men who

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were selected to complete the organization also were granted the Fellowship. The original committee of four who organized the American College of Dentists have performed an act which is very much like a bank president lending money to *himself* and signing the note *himself* as security to the bank. Such things were formerly done in the financial world, but at the present day bank examiners and depositors are not in favor of such proceedings. In fact the bank president would be unwise to do such a thing because of the criticism that would be heaped upon him regardless of his financial ability in other lines.

It may be perfectly proper in the scientific and professional world for a group of men to organize a College and then grant fellowships to themselves, but it at least has created a criticism in the dental profession that refuses to be muffled, and will for a long time interfere with the beneficial development and good will of the American College of Dentists.

Other mistakes that have been made by the American College of Dentists have also been of such a nature as to have a definite influence upon the good purpose of the organization. Knowing the men connected with the organization as we do, we are convinced that the work which they have started will be a benefit to the profession, but very probably that benefit will be reaped after all of the present dental profession have passed away and the organizers of the American College of Dentists will have passed to their reward and be remembered only as organizers of the American College of Dentists and for the work they did for the profession, and not as F.A.C.D.'s.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The British Society for the Study of Orthodontics

An ordinary meeting of the Society was held at 11 Chandos Street, Cavendish Square, W., on Monday, October 3rd, 1921, the President, Mr. J. Lewin Payne, in the chair.

The Minutes of the last meeting, held on May 9th, were read and confirmed.

Mr. Walter Crane's "Casual," "Replantation of an Upper Lateral," and the discussion, appear on page 407.

Mr. S. J. Steadman's "Casual," "A Case of Underhung Bite," and the discussion, appear on page 410.

Mr. W. Warwick James read a paper, "Treatment of Cases in which the Bite Is Too Close" (appears on page 411).

The following newly-elected members signed the obligation book and were formally admitted to membership of the Society: Mr. S. H. Roe and Mr. Barrington Eady.

The following were ballotted for and elected: Mr. Alexander B. Aldred, L.D.S.Eng., Mr. W. E. Coe, L.D.S.Eng., D.M.D.Harvard, Mr. W. W. Whittington, L.D.S., and Mr. A. G. Wilson, L.D.S.Glas., D.D.S.Penn.

Notes of Interest

Dr. John Milton Jones announces his removal to 7th Floor Orpheum Building, Wichita, Kansas. Orthodontia exclusively.

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ORIGINAL ARTICLES

PRESIDENT'S ADDRESS. DELIVERED BEFORE THE ALUMNI SOCIETY OF THE DEWEY SCHOOL OF ORTHODONTIA, APRIL 27-28, 1922

By Jos. D. Eby, D.D.S., New York, N. Y.

As evidence of the highly appreciated honor and the confidence which you, my fellow alumni, have reposed in me, it is my privilege as President of the Alumni Society of the Dewey School of Orthodontia to address you this morning.

During the past year the moments spent in thinking over what I should say to you have been filled with a degree of personal pleasure and the presidential addresses which I have delivered unto myself have been far deeper than any which I can possibly give to you, as there has gone through my mind practically every detail concerning you as individuals in the pursuit of your duties from the plaster impressions up to your present progress.

This is not the time to review those delightful memories but rather does it fit the occasion to deal with the general factors in the development of this Society constituting the agencies which make for the motive power and determine the direction of our progress, and which are to guide us along the pathways of the future. In the desire to realize clearly those intangible elements, the subject matter of my thoughts has crystallized around the past, present and future with their many interesting phases and interrelated conditions, which should be kept carefully before us with a view of anticipating and regulating the policies of the future instead of running blindly along unknown avenues which would divert us from those paths of progress which mark proper advance.

Let us make a review of the past to enable us to determine to a cer-

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tain extent our present status and to govern ourselves accordingly in the future.

The Alumni Society, like the school, has been the result of evolutionary growth, brought about by conditions over which no one had very much control. In fact the development of orthodontia as a science has been the result of demands in the dental profession that *science* be followed for the correction of malocclusion of the teeth.

As interest increased in this line of work, it naturally followed that men would seek certain sources whereby they could obtain knowledge, and, as interest grew more keen, that schools should spring into existence, just as they have in other branches of science.

The Alumni Society, of course, was the natural outgrowth of the Dewey School, which itself to a certain extent was the result of these before-mentioned conditions. The first class came into existence in 1911 by the solicitation of men who desired to obtain instruction under Dr. Dewey. By a peculiar coincidence, the entire class came from Kansas and, while the numbers were small, nevertheless that first class, in which Dr. Esterly took a leading part, may be considered largely responsible for the organization of the Dewey School as we know it today.

Immediately after the close of that course, which was more of a special course of instruction, Dr. Dewey began to receive communications from men all over the United States asking for instruction in orthodontia. As a result of their requests, the Kansas City School of Orthodontia was organized to provide a place where men could obtain instruction in this science.

The next class was in 1912 and in numbers it was increased by exactly 300 per cent over the membership of the preceding year.

Sessions have been given ever since that time. The class of 1913 was distinguished by having as one of its members the first man to attend with an M.D. degree only, a rhinologist by profession who took a complete post-graduate course in orthodontia. I refer to Dr. Reginald R. Walker of Washington, D. C., who is now a member of the Faculty of the Dewey School giving lectures on rhinology as related to orthodontia and such other phases of rhinology as pertain to our science.

The class of 1914 was the largest class of any up to that time and it was the members of this class who, among themselves and by correspondence with previous classes, persuaded Dr. Dewey to change the name of the Kansas City School of Orthodontia to the Dewey School of Orthodontia, as it has since been known to the profession. The class of 1914 was unique also because of the wide range of territory from whence its students came, enrolling men from Canada to Texas and from the Atlantic Seaboard to the Pacific Coast. This class also started the movement to organize the Alumni Society as it exists at the present time.

The first President of the Alumni Society was Dr. F. B. Wilcox of Topeka, Kansas, a member of the 1914 class, and the first Secretary was Dr. A. C. Gifford. Prior to 1914, the Alumni Society had existed only as a social institu-

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tion marked at the end of each session by a banquet attended by members of the class, the Faculty, and such graduates as desired to attend.

With the organization of the Alumni Society in 1914, it was the purpose of the founders not only to make the Alumni Society a social organization but also to extend its usefulness for a scientific purpose, namely, the advancement of orthodontia, and also for the stimulation of interest among the graduates of the Dewey School. The first meeting of a scientific nature was held in Kansas City, Mo., in February, 1915, and was attended by your President. A paper was delivered at that meeting by Dr. Lischer, and Dr. Federspiel gave a series of lectures on oral surgery as related to orthodontia.

The next meeting was held in Kansas City, in 1916, and it was then decided that, for the convenience of members who were located at a considerable distance from Kansas City, the meetings of the Alumni Society would be separate and independent from the session of the School and would be held in such cities as the membership should designate.

Therefore, the 1917 meeting was held in Chicago, March 13-16. It was the first attempt the Society had ever made to hold a four-day meeting and it was highly successful. At that time it was planned to hold a similar meeting the following year but the time and place were not decided upon. In September, 1917, the American Society of Orthodontists met at Excelsior Springs, Missouri. During that week the Executive Committee and the officers of the Dewey Alumni Society had a special meeting and decided it would be to the interest of all the members of the Alumni Society to hold the meeting just *previous* to that of the American Society of Orthodontists.

Dr. Dewey objected to this, however, because he realized the motives would be misinterpreted (and events proved that they were) but the members of the Alumni Society decided that, as they composed the Society and their motives were beyond criticism, it was best to hold the meeting of the Alumni Society prior to that of the American Society of Orthodontists, and this decision was carried out until this year.

This year it was decided that it would be more desirable for the Alumni Society to meet *after* the meeting of the American Society of Orthodontists.

This, in brief, is an outline of the history of the development of the Alumni Society of the Dewey School. The growth of the Society in the last few years is sufficiently familiar to all of you as not to warrant discussion here.

It has always been the desire of the officers of this organization to develop a scientific program which would be of value, first, to the members of the Alumni Society and, secondly, of interest to the men outside the Society. Owing to the success which the officers have had in the past in securing essayists, a number of men in the orthodontic profession have for many years availed themselves of the privilege of attending these meetings and we would say that they have always been, and always will be welcome. It is to the credit of the Alumni Society that men prominent in the orthodontic field have been willing to read papers before us.

At a meeting held in Chicago, in 1917, Dr. Mershon gave a complete exposition of his band technic and lingual arch, and ever since his methods

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have been largely used by the orthodontic profession. Dr. Charles R. Baker of Evanston also read a paper at that meeting and I think Dr. Baker has attended every meeting of the Alumni Society since that time and he will always be welcome.

In his President's address before the Society in 1917, Dr. Purcell suggested that the organization be changed and that instead of being an Alumni Society it be made a scientific society of orthodontists, allowing anyone who so desired to become a member. Dr. Purcell had the courage of his convictions but, nevertheless, most of the members believed he was mistaken. They realized that those intimate elements, born in the minds and hearts of men who have struggled through an organized institution together, producing necessarily that close feeling and common possession of thoughts which are so allied to kinship, are injected into an alumni body as the outgrowth of a parent organization and that to change this would be to destroy those deeper purposes specific within the organization, as well as the fundamentals upon which it was founded and the purposes for which it was intended. Dr. Purcell's plan was, therefore, abandoned. It was felt, too, that men who were not graduates of the Dewey School and could not obtain membership would, nevertheless, always be shown every courtesy. The result of following that plan has proved it to be wise because it has enabled the Society to be a more closely united body with a more decided and definite purpose than a general scientific orthodontic society could be.

Just here we would call your attention to those articles in our Constitution which provide for the admission of Honorary Members. Last year this Society exercised this provision by honoring with this high rank Doctors Martin Dewey, E. A. Bogue and V. H. Jackson, men whose faithfulness and contributions to science will serve as monuments in the background of progress. It is noteworthy that the last paper written by Dr. Bogue before his death was read before this Society.

Owing to the large success which the officers of the Society have had in arranging programs for previous meetings, it is gradually becoming more difficult to provide a program for each succeeding meeting and still keep up the standard that has been set by the previous programs. Just here I wish to pay a tribute to Dr. W. E. Flesher of Oklahoma City and give him special credit for his interest and energy in developing the program for this meeting and also to thank all the officers of the Society for the work which they have done this year in arranging a program which I feel is second to none that has ever been presented.

A new departure has been arranged in the manner of reporting cases which our Secretary, Dr. Burke, in his inimitable manner, has called the "Family Fair," the idea of which is to promote that degree of freedom and close relation which should characterize an alumni society and procure more intimate expressions than have been given in the past.

Regarding our present status, we may now look upon our organization in a way entirely different from that of the formative years of the past because of the fact that the Dewey School of Orthodontia, which we all hold

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dear unto our hearts as the parent body of which we are the offspring, is a live, permanently established and a virile organization which, under the leadership and constant care of Dr. Dewey, we have every reason to believe is going to continue to improve and to undergo that degree of expansion which will enable it to meet the demands and increasing requirements of modern progress in orthodontic education. With the addition of each graduating class into our fold, we confidently expect to grow into greater proportions and never become a senile organization. Because of this fact we should each feel, as individuals, a great degree of personal interest and pride in the welfare of our Alumni Society, and the officers particularly should be alert to provide for the increasing demands which the progress of the time and the changing conditions will require.

Just here I wish to evoke your most jealous care in selecting your officers in the future with regard to men of energy and in whose hearts the interests of our Society are deeply planted.

It comes to my observation that our Society has outgrown the present Constitution and By-laws and, for this reason, I wish to suggest that the proper procedure for their revision be effected at this meeting.

I believe it would be unwise for our Society to hold its meetings prior to the American Society of Orthodontists but, inasmuch as great numbers of allied, associated and subsidiary societies meet at the time of such organizations as the American Medical Association, the National Dental Association and others, there can be no reasons fostered why, as a matter of convenience, we should not meet according to this year's plans in relation to the American Society of Orthodontists.

I think it is with a great sense of gratitude that we should welcome those guests who have come to bring contributions of knowledge to our program and we trust that they will feel that degree of welcome and freedom which truly exists for them here and be as one among us.

There is nothing more gratifying to my heart than to make note of the fact that, with practically no exceptions, wherever an alumnus of the Dewey School of Orthodontia may be located, he is found to be strong and stalwart, with uprightness towards his fellow-men and free from any of those minor traits which detract from both the individual and the organization of which he is a member and, in noting the character of our Alumni Society in this regard, I would charge each of you to maintain those high ideals, that hunger for knowledge and advancement which sweeps all petty things before it and keeps us standing clearly in the field as true professional men.

In view of the fact that constant study is the only key to progress, I would say there are several correlated sciences to which I wish to invite your very serious attention. I believe that each of us should consider it his bounden duty to become familiar with endocrinology, nutrition, pediatrics and other associated sciences and I am firmly convinced that the next epoch marked in the advance of orthodontic science will embrace a broader field which will include in its scope a practical knowledge of these subjects. I

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would not suggest that they be followed as a hobby or as a fad, but carried along with other practical progress.

There is one other matter which has occurred to me frequently this year which I would like to bring briefly before you. All of you occasionally run upon valuable literature, instruments, materials or the solution of difficult problems and I have thought how characteristic it would be of an alumni body if we would think enough of one another to pass these suggestions along even though it be only to have a postal multigraphed. So that we may readily adopt this policy, the names and addresses of the Alumni membership have been printed in the program.

In conclusion I cannot but allude again to the honors which you, my dear friends, have so bountifully conferred upon me. It is with a feeling of pride that I realize my entrance as an instructor in the Dewey School in 1912, broken only in the years 1917 and 1918, has given me an intimate personal touch with you which I greatly cherish and I am also proud to acclaim the fact that, through storms and fair weather, through abuse and laudation, and in matters of great policy or of small details, I have never found in Dr. Dewey but one and the same man, and that with his human interest, his scrupulous judgment, honesty of purpose and unerring integrity, he has developed those things which have brought us here together today.

For these reasons we may well be proud of the fact that our Society bears the name of the Alumni Society of the Dewey School of Orthodontia.

DISCUSSION

Dr. Sydney W. Bradley, Ottawa, Canada.—When I received and read our President's Address some few days ago, I was a little surprised and greatly pleased. I expected to read something very heavy, something which would be on such a plane above an ordinary practitioner's thoughts and ideas that it would be most difficult for me to say anything worth while about it. But you have heard and enjoyed it, and it sounded much better from our President's lips than it reads. It is a history of our Alumni Society, clothed in beautiful language and sweet thoughts that only men of the kind, loving nature of our friend Joe Eby can use.

I first met our President in 1915 in Kansas City. He demonstrated the making of the Jackson removable appliance to us there. I had never seen before, and have not seen since a technician who could bend and manipulate wire as did Dr. Eby. His demonstration was a revelation to me, and the presentation of the subject was just as splendidly done as was his technic on our models. His kindness and approachability made him our friend in a few hours, and we kept him busy from the time he came to the day he left us and nearly missed his train. I can see him yet with his grips and luggage around him ready to go and his taxi waiting, but Joe was still teaching and we were still listening and learning till the last minute. Finally we just had to pack him and his luggage into his taxi. He made the train but had not a second to spare.

His untiring energy and enthusiasm for the progress of our science is still shown to the present moment in the amount of work done in the meeting just closed. We have just had the best clinics we ever had at any meeting of the American Society of Orthodontists which I have had the pleasure of attending so far. And we owe to Dr. Eby our gratitude for securing them, and the splendid manner of their arrangement and presentation.

As I said before, I expected to have to try to discuss some wonderfully clever paper on one of the abstruse themes of our science, something similar to Dr. Timmes' essay perhaps, but I was pleasantly surprised for it is very difficult for the ordinary orthodontist to discuss such papers and problems, but I believe the mass and file of our specialty are reading and

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studying more of the theoretical phases of our work than ever before. It is well, indeed, we are, for as John Bright said years ago, in an address on National Morality, that the nation dwelt in the cottage and not in the palace, so do I believe that the future success and recognition of our specialty depends upon the work and results of the ordinary, everyday toiler, just as much, if not more than on the work of our teachers. While we cannot and must not get away from correct mechanical forces and fine technic in applying them, we are, I believe looking more and more beyond this domain into the wonderful and puzzling realm of etiology. To try to solve this problem, we must study the biologic aspect of our work and form in our minds that general conception of perfect results, but at all times maintaining individual characteristics in the patient's facial contour and masticating apparatus. Even a superficial reading of endocrinology, nutrition, pediatrics and the allied sciences will show us that there are unsolved problems in our science, but until they are solved we are more or less groping in the dark. And we must remember, too, that this theoretical knowledge is the foundation of practical results. We cannot separate theory and practice. Professor Arthur Thompson in his book on "The System of Animate Nature" says, in speaking of the Aims of Science, "Science expresses a quite specific endeavor to get phenomena under intellectual control, so that we can think of them economically and clearly in relation to the rest of our science, and so that we can use them as a basis for secure prediction and effective action. Knowledge is foresight, and foresight is power. The direct motives of science are in the main, intellectual curiosity, a self-preservative, dislike of obscurities, a desire for unity and continuity in outlook. Often, in particular cases, the immediate motive may have been utilitarian—a desire for mastery, but the great majority of important practical discoveries have behind them a long labor of theoretical research pursued for its own sake."

Dr. Eby spoke about changing the dates of our meetings to follow rather than to precede those of the A. S. O. If this pleases the majority, it is best. To my mind it does not matter when we hold our meetings, but I do think a two-day session is long enough, especially when linked up with a three-day session of the A. S. O.

I hope our Alumni meetings will continue to be the success they have been in the past and that real benefit to our specialty and to ourselves as individuals will result from them. After all, that is the important thing to us as a body of scientific men, the application of the results of scientific study in producing healthy bodies and beautiful faces. Can there be more noble aims in the realm of either the arts or the sciences?

Dr. George B. Crozat, New Orleans, La.—Mr. President, Members of the Alumni Society of the Dewey School of Orthodontia and Guests: I wish to compliment Dr. Eby on the excellent manner in which he has presented the history of the development of the Dewey School of Orthodontia, and the Alumni Society. Those members present who have attended the meetings in the past few years can appreciate how this Society has grown yearly from the few graduates composing the first classes to its present size.

The willingness of essayists to appear before the Society as referred to by Dr. Eby has no doubt been very gratifying to the officers of this Society, as well as to the members. It is evidence of the generous spirit of the men who have appeared before this body and their interest in the progress of the science of orthodontia, our school and organization.

The essayist referred to the suggestion of Dr. Purcell in his President's Address in 1917, in that the organization instead of being an Alumni Society that it be made a scientific society of orthodontists admitting any one who so desired to membership. It is well that this suggestion was abandoned at that time, as we can now more fully appreciate the family spirit that prevails in our Alumni Society and our desire to welcome the guests among us. There was no necessity for a second scientific society, in view of the existing American Society of Orthodontists. The founders of that Society possessed those superior motives and ideals which fostered the research and advancement of orthodontia, and gave to the orthodontic world of today the Society it is.

Regarding another topic discussed in the address, namely, the revision of the Constitution and By-Laws, I think it would be well to appoint a committee in accordance with Dr. Eby's recommendation, to revise the Constitution and By-Laws, and bring them up-to-date.

I am in hearty accord with what our President has said relative to its being unwise

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for our Society to hold its meetings prior to the American Society of Orthodontists, and I see no reason why we should not continue this year's plan.

In conclusion, I wish to thank the President for his courtesy in having forwarded me a copy of his address which has made possible the preparation of my discussion.

Dr. Adelbert Fernald, Boston.—I wish to make one or two remarks in connection with the President's Address, which I have enjoyed very much. I would like the President and members to know that I have collected and have on file the annual reports of this Society from the beginning down to the present day. These reports are on file in the Harvard Medical and Dental Library for future reference, and if any member wants to refer to them, all he has to do is to see the librarian of the Harvard Dental School.

Dr. O. A. Oliver, Nashville, Tenn.—I wish to express my appreciation of the excellent address that Dr. Eby has given us. He has covered the entire territory so well that all I can say is to congratulate him and the Society on it.

WHAT WE HOPE TO ACCOMPLISH IN OUR EFFORTS AT ORTHODONTIC TREATMENT*

By T. G. Duckworth, D.D.S., San Antonio, Texas

In attempting to correct a deformity which has occurred through lack of development or as a result of a perverted condition of the mouth and jaws should be with an idea of establishing, first occlusion of the teeth and next the preservation of the teeth and last to bring about the appearance.

From the standpoint of the laity this condition is reversed and 90 per cent of our patients come to us for purely esthetic purposes, then comes the possibility of the care of the teeth and last the relative position of the jaws and teeth in respect to mastication.

The term articulation is frequently used instead of occlusion in describing the movement of the teeth in one arch over the teeth in the opposing arch in the act of mastication and should be differentiated, as the function of articulated bones is different from the function of the teeth.

Normal occlusion of the teeth is a normal relation of the teeth and their cusps of one arch to the teeth and cusps of the opposing arch, and is Nature's well arranged plan according to the individual type and carries with it the ideals of heredity, while on the other hand malocclusion is a deviation from the normal to the extent of interfering with mastication and is the result of a congenital or acquired condition. All cases of malocclusion or maldevelopment are divided into classes and each class is typed for the purpose of treatment and for the convenience of description. The causes of maldevelopment are many, but generally always apparent and work in conjunction with one another in producing various conditions met with. Every tooth bears a certain relation to the approximating teeth in the same arch as well as to the teeth in the opposing arch and they in turn determine all dentofacial outlines as to balance and function.

*Read before the Southwestern Society of Orthodontists, Oklahoma City, Okla., April 22, 1922.

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The efficiency of a denture is dependent upon occlusion and as health is dependent on thorough mastication it is evident that a majority of our children, as well as adults, are not getting the full benefits of their masticatory apparatus.

Orthodontia, we might say, is a borderline specialty as our attention is repeatedly called to the condition of the tonsil, adenoid, breathing, chest development, bone growth, nutrition and to such diseases as would tend to retard or prevent our efforts at treatment.

The application of stress or force upon the teeth through the medium of regulating appliances must be constantly and evenly applied in order to physiologically stimulate cell activity, thereby causing the teeth to assume and maintain a position in normal alignment and as the alveolar process is subservient to the use and maintenance of the teeth and the maxilla and mandible all receive sufficient stimulation to bring about most any desired change in facial outline. The most beneficial example of growth and development is the changing of narrow, constricted arches with an undeveloped mandible that is distal in relation to the upper arch and with a protrusion of the upper anterior teeth and typical chronic mouth breathers to normal, healthy individuals. The establishing of nasal breathing by expanding the dental arches and placing the patient on exercises brings about the general development of the body and is especially pleasing in respect to mentality and lungs. The effect of orthodontic interference is far more reaching than possibly some of you realize when the work is carried out correctly. In any event it takes two to make a bargain and sometimes several to get a result. This is the position we are in regarding some cases, as in any case of orthopedic surgery it requires months and sometimes years to get satisfactory results and you must have cooperation or the work will prove a failure. Fortunately most people are amenable to reason when appealed to in the proper spirit and correct their negligent ways.

It has been the advice of many dentists to delay orthodontic treatment until the permanent teeth are fully erupted, but the orthodontist realizes this advice is equivalent to counseling parents to wait until the case gets as bad as possible, then to correct it. The earlier a case is treated the better for all concerned, as it requires less time, the results are positive and we can exercise better control over the patient. As an example, should we find a child three years of age suffering from malnutrition due to faulty mastication as the result of irregularities of the deciduous teeth they should be corrected and not delayed. Preventive measures are carried out at this early age which insure normal development of the bones of the face and the proper eruption of the permanent teeth. There are of course a number of mishaps of a traumatic nature that would seriously affect the final outcome of this early treatment. Modern medicine has definitely demonstrated that practically every disease proceeds from external cause and presents a specific set of chemical, functional, and structural changes from the normal, and to say that the institution of preventive measures would insure normal development in the future and that it would bring about the proper eruption of the

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succeeding teeth, would probably be going too far, but it does offer the individual every opportunity to ward off disease and to take advantage of the best environmental conditions. Eruptive fevers play havoc with our chances for normal occlusion in many cases as there is a gradual disintegration of the enamel which brings about the loss of contour and broken approximal contact points which are essential to the maintenance of the teeth in their proper positions. Again, we find a gradual state of evolution existing in respect to the third molars or wisdom teeth that is often perplexing. The third molars are generally imperfectly formed, crowded or impacted, and frequently missing entirely, which can only be accounted for through the development of the forebrain at the expense of the jaws. The eruption or partial eruption of the third molars takes place after the seventeenth year and it is through their attempts at eruption that the anterior teeth are crowded and misplaced, which is the undoing of many cases of regulating and the production of many new ones. The presence of the third molar in the dental arch is often a source of trouble and is seldom considered an important factor in mastication, in fact the extraction of these teeth often assists in mastication. The preservation of the teeth is made possible through continued effort and where we can lessen this effort it is more probable that the mouth will be cared for with less injury to the teeth through decay and the gums will be subject to less irritation and free from disease. It is almost impossible for anyone to properly polish and remove deposits, such as salivary calculus, tobacco stains and rough surfaces of enamel from teeth that are crowded, overlapped, or partially impacted. When the teeth are regular in form and shape and the occlusion is correct they are more or less self-cleansing through the action of the saliva, lips, tongue, and cheeks. The excursion of food over the surfaces of the teeth in the process of mastication will prevent the forming of plaques which tend to seal the organisms next to the enamel with consequent dissolution of the cement substances between the enamel rods. With ordinary use of the tooth brush and rinsing of the mouth with deodorants the toilet of the mouth can be well maintained.

Having considered occlusion and the maintenance of the teeth, esthetics should not be neglected. Any one with personal pride wants to look and appear as well as possible, but he should not let his vanity get the advantage of his best judgment when it comes to the teeth as we are not infrequently called upon to extract some tooth that is out of line and presents an unsightly appearance. Should we consent to follow out the wish of patients and extract these teeth it would absolutely defeat the object which they wish to bring about, namely, the appearance. For the time being it may improve, but finally the remaining teeth in the arch begin to drift and when they permanently come to rest the occlusion is destroyed and the appearance is no better than it was before the tooth or teeth were removed.

The most depressing thing is where parents have the permanent teeth of their children removed with the idea that too many teeth are present and that the remaining ones will straighten out by themselves, and never seem to realize that the children may some day wish to have their teeth regulated

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on their own initiative and at the same time get normal results which would be impossible since some of the teeth had been extracted. When extraction is resorted to with an idea of establishing normal occlusion of the teeth then it is simply an attempt to dodge the responsibility, and one cannot hope for more than a compromise, which means extracting some tooth or teeth in order to rearrange the others for the sake of bettering the condition and with no hope of establishing the normal, and is indicated only in patients of advanced age. The extraction of impacted third molars and supplimentary teeth would be indicated as an aid to treatment.

Frequently the first permanent molars are lost very early, which produces a marring effect upon the facial outline that could be prevented if it was realized that the teeth were permanent ones and that they are the most important teeth in the arches as they determine the position in which the succeeding teeth must erupt and the size of the arches which are always diminished in length and in breadth as a consequence.

Nature has been very kind insofar as it concerns the size and shape of the individual teeth and it is only in isolated instances that we find a case where the relative mesio-distal width of the upper teeth is greater than the corresponding lower ones or vice versa. There is most always a fairly constant relation of the cusps, and in the number of cusps on each tooth, which makes it possible to restore a perverted condition as all the tissues associated with the mouth are subject to change, and respond to mechanical stimulation except the enamel. Appearance is dependent upon the formation of the enamel as well as the arrangement of the teeth and relation of the bones of the face. There are conditions of the enamel such as stains or imperfect deposition of lime salts that preclude any possible improvement in the color or shade of the teeth. In some sections of the country the teeth become mottled through the water that is used or at least this is the supposition and is of considerable concern. The structure of the enamel does not seem to be impaired, but the deep, dark stain that covers the surface of all the teeth in some cases is a great objection.

In patients of advanced age, where malformation exists, especially in cases of overdeveloped mandible, it is a difficult thing to get sufficient recession to restore all the features of the face. These patients, however, cannot expect a complete change in the contour and are generally content with any improvement that we can make.

In diagnosing cases it requires considerable preliminary work in the way of making original models, facial casts, photographs, x-ray examinations (intraoral and extraoral) which enables us to fairly well estimate the time required for the treatment. The case history will give us information that is of vital importance and without this history we are very likely to promise patients more in a corrective way than is possible to accomplish, and is especially true in children that have suffered with rickets, eruptive fevers, accidents, etc. I have x-ray negatives of a case with me which are very interesting. A boy fourteen years of age who gives a history of an accident that occurred several years previous to the examination which shows that

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the alveolar process and labial portion of the maxilla was forced to the lingual in the region of the superior cuspid on the right side. At the time of the accident the deciduous teeth were present and the permanent cuspid was only partially formed, lying in the crypt which was misplaced, and as a result the odontoblasts became inactive and the enamel portion of the tooth was found encysted and had to be removed. The antrum was partially closed and as the cuspid did not form, the eminence was destroyed and the right nostril was very narrow and constricted with the facial outline, anything but pleasing. The best we could promise this child was a compromise, as the attachment, namely, the cuspid, which is a long tooth embedded high in the process, is gone and it means opening up the space and inserting an artificial substitute which precludes any chance of restoring the features except in a limited measure. The bicuspids, however, are being moved to the buccal in the general expansion of the arches with the hope of opening up the nostrils and relieving the buccal walls of the antrum. The scar-tissue over the region is going to be a hindrance to the maintenance of the parts in their new position and must be controlled through exercise and massage. The tissues of the oral cavity will stand a great deal of abuse, due to the free supply of blood to these parts, even though some of the bony structure is misplaced, if nothing is missing, the appearance can be established in most instances. It is a fact, however, that apparently simple cases will not yield to treatment, which is no doubt the result of complicated etiologic factors and our inability to combat them in the absence of any exact knowledge of the peculiarities of development which can be applied to the case. We cannot foretell in advance of treatment the rapidity with which bone growth will take place; and with all modern means at our command in analyzing the condition we occasionally run across a case with which we blunder along with a mixture of happy hits and unfortunate misses and never get what we desire in the way of results, although fine technic and skillful operative methods enable us to reduce these failures to the minimum.

We have many types of children to deal with which are in varying stages of development, and our chances are great in studying the details which bring about the most satisfactory results; it also enables us to see the advantages and disadvantages of certain forms of appliances used when treating young children, also those employed in older children. The age may range from three, four, and five to fourteen, fifteen, and sixteen. Anxious parents are extremely grateful for any assurance of a successful and permanent result, and it is only in the very young children that we can rely upon the results as being permanent without a great deal of discomfort to the patient in wearing retaining appliances over an indefinite period.

I believe it is possible to fulfill the demand of science in orthodontic procedure, but this necessitates a close study and a more intimate knowledge of the habits of bone growth and of the tissues we are to operate upon, for let us remember that we can do nothing of permanent value by ourselves in our efforts at treatment, but only as we work in conjunction with Nature, studying her carefully, interpreting her wishes and intelligently assisting in her

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efforts of growth and development. Fortunately we have some wonderful chapters on histology and embryology, and a study of these must convince us of the most active period of development. The beginning and ending of calcification of the osseous tissue should be a guide in assisting Nature to build the parts in harmony and according to normal influences. If we are going to allow abnormal influences to intervene at three years of age and then correct them at twelve, our motives must be other than the importance of a full complement of teeth well arranged, and the very important part that each tooth plays in its relation to all other teeth of the denture, that the denture may not only be in function most efficient, but that it may contribute its full part to the normal beauty and balance of the face according to the individual type, and also its normal part in the possibility of normal growth and development of the throat and nose, all of which are so essential to the health and growth of the individual. To recognize and combat abnormal influences in their early stages, means a great deal towards prevention, and while in itself not complete, will aid materially in treatments and shortens the period of retention.

Cleanliness of the mouth must be observed during the treatment, and if the appliances are adjusted to temporary teeth to the extent possible, we can avoid injury to the permanent teeth which would otherwise occur at least to a limited, if not to a greater degree. The actual movement of the teeth apparently seems to be accomplished in the older patients almost as readily as in younger children, but the retention in the older children of twelve to fourteen is never positive in my experience. I do not mean that the arches collapse entirely or that the teeth go back to their original position, but there is invariably some crowding of the anterior portion of the arch with one or two teeth slightly overlapping on the lingual or buccal inclination of some tooth. This condition of affairs spoils the effect of one's efforts toward an ideal result and lessens the hope of ever obtaining what is ultimately desired in these cases.

A number of cases, no doubt, have failed in our hands even after prolonged retention, due to our inability to recognize and correct abnormal influences which continue to act after the retainers are removed. It is often surprising, the cooperation received from some very young children and the instructions to these patients are more religiously carried out. The mother assumes the responsibility of seeing that the child keeps all the appointments and at this early age other allurements have not the attraction to keep the patient from the office, that they have at a later period in life. If the child is supplied with new and correct guiding impulses it is more apt to acquire an ability to combat abnormal influences, bringing about coordination of muscle groups and a complete control of their muscular mechanism. This must in time have a beneficial effect upon the parts we are directly concerned in and our teaching has accomplished what later would have been done by mechanical interference, with a useless waste of time and treasure. From the beginning, an individual is constantly surrounded by influences and environmental conditions that ultimately establish the character and development

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of the parts, and unless every precaution is observed against interference to health and harmony of functional adjustments, disease and inharmony will reign.

Every evidence of interference should be discouraged at its incipiency so as not to allow the parts to lose their normal activity in the slightest degree. The solution of our difficulties should and I believe will soon be largely one of prevention; at least, we will be able to so govern the patients that they can be brought to realize the responsibility of their own destinies, to the extent of reporting to the orthodontist early enough, so that preventive measures may be adopted and the slight maldevelopment corrected. This would insure the parents of the necessity of looking after and caring for the temporary teeth, and the importance of their proper retention and loss, and the influence they bear in reference to the permanent set.

The tonsils and respiratory passages should be thoroughly examined for the detection of any probable interference from these sources; in fact, each of those forces which tend to produce inharmony of the parts should be eliminated and the attention of the parents called to their probable correction. We should lend to Nature a little assistance during her early developing period, at a time when the balance between normal and abnormal is nearly equal and the influences of an abnormal nature are fast making themselves apparent. The natural forces, such as cell metabolism, forces of the inclined planes, normal approximal contacts, harmony of shape, and sizes of dental arches, atmospheric pressure, muscular pressure and such interferences as may be grouped under the heading of mental, respiratory, and postural, may be encouraged to assume their natural attitude toward building the dental apparatus along natural lines and in keeping with the individual type. Greater efficiency in development and greater rewards from the standpoint of health must be the result of this early attention. The chances are just as great and as necessary or even more so in teaching children how to prevent abnormal influences as it is to teach them to overcome certain influences, and even though the opportunity has not presented itself for such instructions until after some mechanical correction is found necessary, it will at least prevent further deflections in proportions to the degree of thoroughness in which the instructions have been given, and the sincerity in which they are received and carried out.

Occlusion after all is the important factor to be considered as it is viewed from an imaginary line established by Nature in her most perfect dentures and is applicable only to the case in hand as it is impossible only to approximately predetermine the size and shape that an arch should be. When the teeth are arranged in the line of occlusion either naturally or by means of mechanical interference they are then normal and all the associated bones and muscles of the face tend toward harmony, and work to the perfection of the individual in symmetry and beauty.

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SOME OBSERVATIONS IN REGARD TO THE MANAGEMENT OF OUR CLIENTELE*

By William Roy Humphrey, D.D.S., Denver, Colo.

THE practice of orthodontics, as we all know, throws us into very close relationship with children, and it can almost be said, that if we are successful in the practice of orthodontics, we are lovers of children. In the Gospel of St. Luke are found the words, "It were better for him that a millstone were hanged about his neck and he cast into the sea than that he should offend one of these little ones."

We have these children as patients in most cases for a period of time, much longer than the average practitioner of any kind, and therefore in more instances than we are aware of, have something to do with the molding of their ideals and ambitions. As they are, of course, at a very impressionable age, they are as clay in the hands of one who has gained their confidence. And though we may not always be cognizant of the fact, many of our words and actions make a deep impression on their minds which may be secretly nursed until they really affect the child's future; at the same time, neither the doctor nor the patient realizing their origin.

Since the greater part of our clientele is made up of children, most of these observations are applicable to them. There is no need of saying there are many varieties, and what might be considered good management for one and what might even have proved to be good; it is obvious that it would not be good management for another. Therefore, it seems to me that any line of management that one gives must only be considered in general. It is my object, therefore, to treat the subject in a general way, citing certain examples from my experience as well as from the experience of others.

We very often hear this term used, "He is a normal child." I have often thought of this remark and I arrived at the conclusion that all children are more or less abnormal. The normal individual is an ideal. We get our norm by striking the average; those who deviate are "ab" or "sub" normal. If you will permit me then, I will say that most children are abnormal.

First of all I will mention several of the methods that I have used to advantage in treating them as orthodontic patients. It was suggested to me, shortly after I entered the practice of orthodontics, by Dr. A. H. Ketcham of Denver with whom I am associated, that I study psychology. I have studied it somewhat for the last few years and in reading different books upon the subject, I became interested in the newer psycho-analytic method, especially as expounded in the work of Dr. Edmund Freud who, if not the cre-

*Read before the Rocky Mountain Society of Orthodontists, March 7, 1922.

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ator of the science, has certainly been its foremost exponent. And since he practiced his theories for many years before he began writing and teaching them, we may say that his work has come out of the laboratory and not from the library. We believe it is sound and has real merit. The following is taken in part from his work: (a) "All functional neuroses or nervous disorders have their origin in the experiences of early life; some fearful or otherwise abnormal occurrence has created the difficulty or the complex which is the term now current. (b) These fears or irregularities upset the whole nervous organism. This fear or developing complex seethes in the background of conscious thought, or even in the subconscious mind, growing constantly larger and more menacing and demands discharge or expression—always in a perverted form."

We have the doctor to thank in these statements for scientific proof of a fact which we have always more or less recognized; namely, many patients have been utterly ruined by mismanagement when children. They have developed a dental complex. I feel quite safe in stating therefore that a very important part of the management of children, as patients, is the first visit. The best way to greet children, in my mind, is cheerfully. A smile will do more to gain the confidence of one of these little people than will many promises. If it is the first visit the child has ever made to a dental office of any kind and we greet him very cheerfully and proceed in a natural way without nervousness or haste, being careful to do nothing to hurt or frighten him, we will find it very easy to gain the confidence of this impressionable little person. It is always our custom to take impressions with modelling compound at the first visit, so that study casts may be made from which to make a diagnosis. Plaster impressions are taken at the beginning of treatment. It has been Dr. Ketcham's custom, and I follow it, to mold something from a piece of the modelling compound and give it to the patient, for example, a small hat, a marble, or a basket. The child is then interested above all in its new possession and if anything lingers in its memory, it is what you have made rather than your operation. If it is necessary to make x-ray exposures, which it usually is, an explanation of the pretty light and telling him you are going to take a picture of something we cannot see will only make the friendship more secure. Before going further, we will take an instance where the child has been to someone, who either thoughtlessly or carelessly has not been tactful to the extent of building up the proper confidence. Our procedure may vary. It is best in my mind to have a patient of this kind to one's self if possible. Perhaps, if it is one of our younger patients, it is well to question him as to what he likes best of all, and then pretend that you are greatly interested in this same subject. I use this a great deal even with my older patients and by merely being a good listener and furnishing an appreciative audience for the recital of their pet hobby, I am almost sure to gain their confidence. This slight deception if used tactfully, has proved advantageous to me and I have really become interested in many of the things brought out by these children. In case some one might misunderstand me I would say that to

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practice any deception is dangerous. A child as a rule will very quickly sense the deception. But you can with very little effort be really interested in the child's hobby. After I have succeeded in gaining their confidence, I then proceed just as if they were perfectly accustomed to the sort of thing and in my experience usually succeed in laying the foundation of a good patient and a warm friendship. There are some few children, however, that do not yield to any of our reasoning and simply "balk" so to speak at all attempts at applied psychology. These are usually children who have had little or no home discipline or perhaps are subnormal. And it is sometimes necessary to persuade them almost to the extent of forcing them to permit an examination. However, this is surely the very poorest form of management and when resorted to, in my mind, simply proves our lack of proper methods and to some extent points out the need for some study along these lines. Many have almost been forced to undergo an examination and afterwards have proved themselves good patients because having experienced something which they abhorred and found it much better than they expected. The reaction is very likely good.

Since first impressions, if not lasting ones, are surely important ones, I believe it the very best judgment to be cheerful, kind and sympathetic. For that matter, I find that even after a patient has reached the postoperative maintenance stage of treatment, he still appreciates a cheerful greeting. This is one thing that children never tire of. It surely is not necessary to be a clown or is it wise, in my judgment, to use a stereotyped joke or a worn out phrase as a greeting, for after a few visits they appreciate your remarks and the novelty wears off. Do not mistake me; I do not think the patient is coming to be entertained; but if his visits are pleasant, I believe our work will be materially benefited.

We will have no great trouble with the so-called average child if we proceed carefully, using diplomacy and not tiring him at our subsequent appointment. I want to remark on two other important things which have helped in my experience. After an appointment where some appliances have been constructed, or any operation performed which has taxed the patience, it has always been our custom to reward the child with a cup of hot chocolate and cakes, or ice cream during the warmer months. And with the younger patients, during the operations, we have always had one of the nurses read to them some story selected particularly to their liking.

The other thing, which seems to me as very important in the management of our little patients, is always to keep them enthused over the beautiful dental apparatus we are developing for them, with their assistance. We can hardly lay too much stress upon this because in talking with even the younger patients, they have often remarked how much depended upon the development of the dental arches, not, of course, in these words but beautifully described as only a child can put things. Of course, in the younger patients, they are merely repeating what you or someone else has told them. There is a saying, however, that if you tell a person a thing often enough he will not only believe it but repeat it himself.

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Since one can always work to a greater degree of accuracy and with the expenditure of less nervous energy when doing a thing for one who is in sympathy with the operation, I consider it very important to imbue the patient's mind with as much enthusiasm as possible over the event of attaining a normal balance of functional forces and the development of the associated organs. While, of course, this must be done with the most elementary methods, even with the older patients; I find it can be done and, in some instances I have known of children as young as ten years of age explaining to their playmates about how they would be benefited aside from the cosmetic part of the treatment.

It is not uncommon to hear a well educated adult of the laity express much surprise over the facts of orthodontic treatment, which are, of course, common knowledge to us. To my mind then, one of the important things in the management of our clientele is to give some time to the development of appreciation for the ideal in the minds of our patients.

There are a few types of children that I have observed, and they have caused me some vexation, but before I take up a very limited number of cases, I wish to quote from Dr. Alder, another psychoanalyst. While he seems to agree with Dr. Freud in most of the important phases of the subject, he does not agree with him in regard to the causes of all the difficulties. He takes organ inferiority as a first cause, and in reading some of his teachings I found one especially that I consider worth giving you, as it has partially, at least, cleared a few things in my mind. The following is taken, in part, from W. H. Burger and is based upon Dr. Alder's theory of organ inferiority, "It means simply this, if a child, who is physically deficient in some respect, either with regard to external organs, particularly the sexual, or the internal, as the stomach, will be sensible of its inferiority whether consciously or not, and will try to make up or compensate for its short-comings. In the process of attempted compensation its conduct may assume many absurd forms, not only as a child but as a youth and adult. Because of inferiority, it tries to make its place secure. It imagines that it has powers it does not really possess. It lays out for itself a fictitious course of mastery over others and its surroundings and start toward the goal. It lives in a realm of 'accentuated fiction' of unreality. It experiences periods of intense ecstasy as it contemplates its glorious powers. But as soon as these come in conflict with reality, with life as it is, there is just as intense depression. It practices asceticism, abuses the body, disparages others, and even is most punctilious in observing the proprieties, as in social intercourse. It may always be on time in keeping appointments, just to demonstrate thereby its innate superiority to others who are not. So it runs down and depreciates self just to show how humble and free from conceit it is. The implication is always that it is in these and other respects superior." They develop a superiority complex. This theory of organ inferiority seems to me to possess merit. It was a new thought to me and I give it to you for what it is worth.

We all recall the boy, in our own childhood, who was the last in and the

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first out of the swimming pool; who never played games which were rough; and also the one who loved to sit all day and read wild fiction. In one instance, I knew of a youth who could do beautiful needlework. Boys called them "nuts," "freaks," and "sissies," but we must remember they were not always so. Freud, Alder and many other writers agree that in order to help one of these individuals to assume the position in the scheme of things for which he was created we must start at the beginning, or at the place where the patient first began to foster the idea; and it is usually in early childhood, and since we have the child observation at that time, much mutual benefit could surely be derived from observing these irregularities. However, since we are not treating nervous disorders I wish to explain that I am of the opinion that many points in the interest of the management of orthodontic patients can be taken from this theory. I have in mind a patient, a boy, who fits into this class of individuals perfectly. His case required the corrections of posteroocclusion, and of the many cases it has been my privilege to observe here, he comes about as near being inoperable, from the standpoint of lack of cooperation as any. He surely is suffering from "ego," a swelled head, or if you like, a superiority complex. An example of his wild dreams and accentuated "ego" might be found in a remark he made to me. I often ask my patients what they want most to do when they grow up. He told me the following, "Oh, perhaps, I will go into the Diplomatic Service for a short while; I should prefer, however, to accept some position in the capacity of a foreign representative of our government in the country of one of the greater powers." At the same time, he has no pride in his personal appearance and no regard for dental hygiene. He is much underweight, has poor eyesight and is irregular in his habits. The boys of his age call him a "nut" and, as I stated above, although we are, of course, not in the practice of the psychoanalytic system or interested in the cure of such difficulties to any great extent, it is, at least, interesting to note that since we have no little difficulty in treating such patients, it would seem to me that any study we might do along these lines would help in the management of such patients of our clientele, who lean in just a slight degree to these different irregularities. A suggestion at the opportune moment may be of great value in the adult life of our patients. There is not one of us present who cannot recall some person who made a deep impression upon us, as children. Most of us can recall a grouch, some old gentleman, who, either suffering from excessive ego or some systemic disease, simply hated the sight of children. Remember how we loved him? Most of us can also recall kind, cheerful folk who were an inspiration to us. Also the superdignified people whom we humorously imitated. And from among these various people of different types, we surely got many of the ideas and actions we now employ.

In the presence of children we cannot be too careful of our words and actions. Children do not change to any great extent as generations go on. A child of today is pretty much the child of yesterday. It is our own advancing age, in most cases, which seems to set the stage and make the pranks

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of our own childhood assume mischief of a greater magnitude. I have in mind two other types which I wish to refer to very briefly. Time and your patience will not permit me to cite many cases, but if I can provoke a discussion of your experiences, we may yet learn something this evening.

The next type of child is most commonly found among boys, and may be designated "Fresh Type." Among boys, the type very often expresses itself in the form of a "Bully." With girls, they are usually lovers of themselves, as is the "Bully," but they manifest their superiority or freshness by showing their importance. I have known of girls removing their appliances, and when questioned as to the reason, might simply say, "Oh, I was going to a party and wished to take them off." The boy, of the "Fresh Type," is usually a "Bully" among those younger than himself and disrespectful to his elders, but with boys of his own age, he is very often a coward.

To suggest a plan of management for this type is indeed difficult. I have studied how boys, or girls of their own age deal with them. I find for the most part, they ignore them. We can surely learn from this. And as we all know them to take advantage of any privilege extended them, I think that here is one place where reserve and dignity are advisable. "If you give them an inch, they will take a mile." I recall one boy addressing me as, "Well, Old Topper, if I want to run around here what are you going to do about it?" We should surely conduct ourselves in such a manner with this type of patient, to compel respect. Very often this is difficult, as these patients in most cases come from homes of wealth where, surrounded by servants as they are, and having everything, they are surely poor material as orthodontic patients. We may be happy that they make up a very small per cent of our practice. I merely mention them as a type and wish to remind you that I firmly believe that children are prone to laugh at the pranks of such a child, and that their association with one has little effect upon them, if they themselves have the proper environment.

The other type, and the last, I wish to mention aside from the subnormal child, is composed of those who are suffering from an inferiority complex. These are by far the most common, and most of us are affected with this irregularity ourselves to some extent. These children for some cause or other are a little timid at the approach of a new undertaking; some to the extent of actual fear. Even in adult life we see people, when confronted by a new project, so fearful of the outcome that they throw up the whole undertaking. This type of child is much more easily managed than the other types, and anything I have said in regard to building up confidence or appreciation of results applies to them as to the so-called normal or average child. perhaps tempering our procedure with more sympathy as the case may require.

With the subnormal child, I think a line of action corresponding with the mental age is a good manner of procedure. For example, I have been able to get good cooperation from a subnormal patient, twenty-one years of age, by talking to him as we would to one ten or twelve years old by telling him I can surely depend upon him to do things, etc.

Since the title of this paper is, "Some Observations in Regard to the

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Management of Our Clientele," I wish you would take these remarks in the spirit intended. I would not attempt to dictate any line of management of our clientele to anyone. It is largely a personal matter, but I would suggest, especially to the younger members of our profession, who have not had the hard but good teachings of experience, to avail themselves of some of the writings on children (Management of the Child, Child Problems, etc.), the principles of psychoanalysis, and some works on psychology. I will not attempt to name them or the authors. Their name is legion. I will simply say that when I first looked over the lists at the library I came to the conclusion that everyone, with the exception of myself, had written upon some subject pertaining to children. The material is almost inexhaustible.

In conclusion, I wish to say that aside from the pleasure derived from reading the different materials for this paper, the most benefit that I have realized is this: I have resolved to try and form the habit of applying the psychoanalytic methods to myself. As I step into the office in the morning, I would like to say to myself, "Above all, am I cheerful? am I kind? am I sympathetic? and am I in earnest?"

This concludes my observations, but in addition to giving credit to Dr. Freud, Dr. Alder, Mr. W. H. Burger and other writers on the Child, I wish to give credit to Dr. Ketcham for the privilege I have had in observing some of his office procedure.

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"THE HOWARD MODEL PLANE AND MEASURING INSTRUMENTS"*

By Jos. D. Eby, New York, N. Y.

THIS clinic is for the purpose of demonstrating the Howard Model Plane and associated measuring instruments in action.

The machine has been designed and produced by Dr. C. C. Howard of Atlanta, Ga., expressly for orthodontists.

Its purpose is to eliminate many of the time taking phases of model trimming and to produce that degree of uniformity and accuracy which characterizes perfect machine work as often being more uniform and superior to that done by hand.

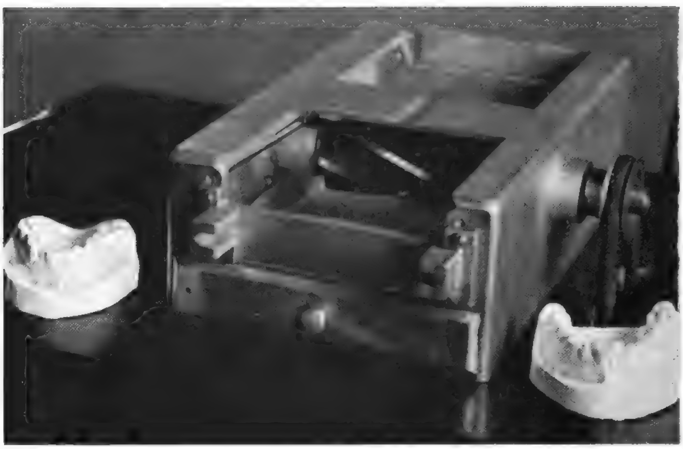

Fig. 1.

The apparatus is motor drawn and is mounted on a convenient sized table with electric switch well located and all but the cutting cylinder and carriage portions are well protected from the plaster cuttings; beneath these is a removable tray in the form of a drawer from which the plaster trimmings are readily removed (Fig. 1).

The only instruments required in the work which are not original in design are a bevel and a divider.

Two small instruments especially designed for determining the general occlusal planes of the teeth and to measure and mark the artificial portions of models are most accurate and unique in the designer's originality (Fig. 2).

One portion of the apparatus which works in conjunction with the before described instruments is the adjustable "diagrammatic measuring table."

The markings on this table are so finely placed as to make it possible to

*Clinic before the American Society of Orthodontists, Atlantic City, N. J., April, 1921.

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instantly establish vertical and horizontal lines, right angles, forty-five degree lines and other measurements which may be also transferred from occlusal points to the backs of models by means of a cord stretched tightly between two upright posts which correspond to the edge of the measuring table so that the model can be marked beneath (Fig. 3).

The "model carriage" is a remarkably well designed mechanism for carrying the model securely over the cutter; the carriage is designed to clamp models directly for cutting bases and also has an additional part which is screwed into place for cutting the backs and the sides of models, either separately or with the uppers and lowers in occlusion (Fig. 4).

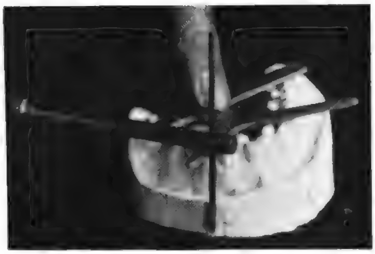

Fig. 2.

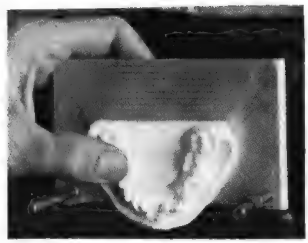

Fig. 3.

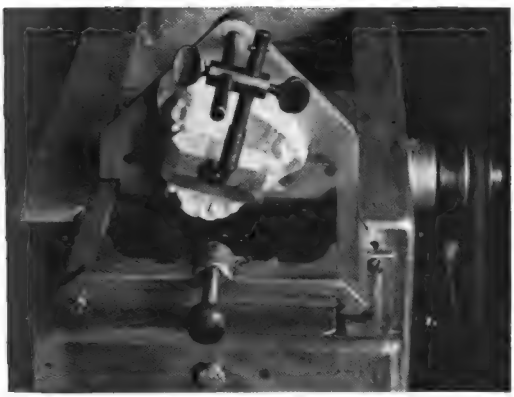

Fig. 4.

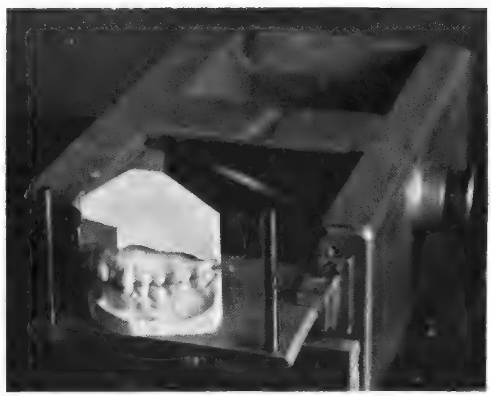

Fig. 5.

It is quite impossible to cut one's self or to cut into any of the anatomical portions of the model because there is only one way in which models may be mounted into the carriage and only one way by which the carriage can be inserted into the milled grooves which carry it over the cutter.

The cutter is protected by an adjustable steel plate cover attached by springs which hold it over the cutter at all times except when the carriage containing a model is passing across and the machine should never be running excepting at these times. (See Fig. 1).

After becoming adapted to the machine, perfect sets of models may be trimmed in from ten to fifteen minutes (Fig. 5).

The clinician explained the machine thoroughly, also trimmed several models in order to demonstrate the methods of trimming and exhibited a series of photographs illustrating all positions of the machine as well as all of the stages of model trimming in detail.

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HISTORY OF ORTHODONTIA

By Bernhard Wolf Weinberger, D.D.S., New York

(*Continued from Vol. VI, 726.*)

MORTON SMALE, M.R.C.S., L.S.A., L.D.S., and J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S., *Diseases and Injuries of the Teeth*, including Pathology and Treatment, 1893, under Chapter II, Abnormalities and Diseases of the Temporary Teeth, we find the following classification: "(a) abnormalities in size; (b) abnormalities in number; (c) abnormalities in position; (d) abnormalities in structure.

"(a) *Abnormalities in size.*—By abnormality in size is meant a variation from the normal, as, for instance, when one or more teeth are comparatively larger or smaller than the rest of the set.

"(b) *Abnormalities in number.*—By abnormalities in number is to be understood either any excess or deficiency in the number of teeth found in the temporary dentition.

"(c) *Abnormalities in position.*—Abnormalities in position are of two varieties—those relating to malposition of individual teeth, and those that have to do with the relative position of the maxilla to the mandible. The only form of irregularity of the first variety which has come under the authors' notice is a slight crowding which leads to overlapping and twisting of the incisor teeth. In the second variety there are three more or less common conditions—(1) Protrusion of the lower jaw. (2) Edge to edge bite. (3) Lack of anterior occlusion (open bite).

"(1) Protrusion of the lower jaw is occasioned when one ramus is developed out of proportion to the other.

"(2) Edge to edge bite is probably due to causes similar to those which produce the preceding abnormality.

"(3) Lack of anterior occlusion, or open bite may be caused in several ways—by thumb, finger, lip or tongue sucking, or may be due to want of development of the ascending ramus, and it might, in some instances, be due to a partial arrest of development of the intermaxillary bone.

"(d) *Abnormalities in structure.*—Additional cusps and variations in the number of the roots are more rarely found in the temporary than the permanent dentition.

ABNORMALITIES OF THE PERMANENT TEETH

"Abnormalities of the permanent teeth can be divided into those of (1) Size; (2) Number; (3) Position; (4) Structure.

(1) ABNORMALITIES IN SIZE

"There is no standard by which we can compare the relative sizes of teeth. It is possible to have the whole series composed of teeth of an abnor-

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mally large or small character. The upper central teeth are most frequently developed to an abnormally large size, but it should be differentiated from a central that has become geminated with a supernumerary lateral incisor. The second lower bicuspid is also frequently abnormally large, approaching somewhat in character to the molar. The second lower molar is also occasionally affected in the same way. The lateral incisors in the upper, on the other hand, are often diminutive and modified in their shape, and in extreme cases are little more than simple cones; occasionally, however, they may be abnormally large. The upper third molar, like the lateral, is often dwarfed and modified in its shape.

(2) ABNORMALITIES IN NUMBER

"Variations from the normal number of teeth may be classified—(a) Excess in number; (b) Deficiency in number.

"(a) *Excess in number.*—Any tooth in addition to the normal number is known as a supernumerary tooth. They may be divided into two distinct groups—first, those resembling normal teeth in shape and character (called by some authors supplemental); second, those abnormal in form.

(3) ABNORMALITIES IN POSITION

"This section of abnormalities brings us to perhaps one of the most difficult subjects that comes under the care of the dental surgeon. The vagaries of nature are so frequent, and the accidental causes that may give rise to various forms of irregularities so numerous, that it is impossible in a manual of dental surgery, where only a few pages can be devoted to the subject, to treat exhaustively of all the manifestations and varieties which occur. It is proposed, therefore, to deal rather with those that are more commonly met with in practice, and to consider them on general principles.

"The causes giving rise to abnormalities in position may be divided into general and local.

"*General Causes.—Heredity, and Neurotic Tendencies.*

"*Local Causes.—Undue Persistence of the Temporary Teeth, Too Early Extraction of the Deciduous Teeth, the Extraction of the First Permanent Molar, Supernumerary Teeth, Thumb, Lip, Tongue, and Toe Sucking, Alveolar Abscess, Mouth Breathing, Cicatrices, the result of injury, especially after burns, lead in some cases to serious deformities. Hypertrophy of the Gums, Exostoses of the Bones, and other Tumors, such as the various Epulides, etc., also act as a local cause of irregularity.*

"*Classification.*—It is not possible to give any general classification of irregularities which will include every variety met with, but for convenience the following will be found useful and practical in considering the subject:

"(1) Irregularity in the position of individual teeth.

"(2) General crowding. This condition is often seen when bicuspids and molars are in good position, and may be produced by the following causes:

"(a) Too early extraction of temporary teeth.

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"(b) Arrest in the development of the maxilla.

"(c) Excessive development in size.

"(d) Excessive development in number (presence of supernumerary teeth).

"(e) Eruption of wisdom teeth.

"(3) Contracted arch (a) The U-shaped arch; (b) the V-shaped arch; (c) the saddle-shaped arch.

"(4) Anterior protrusion of the upper teeth.

"(5) Protrusion of the lower teeth, 'Underhung bite,' 'Edge to edge bite.'

"(6) Nonocclusion of front teeth. Lack of anterior occlusion, 'Open bite.'

"Before proceeding to deal with the above classification in detail, it will be advisable to consider some general principles that should guide the dental surgeon in dealing with these cases.

(4) ABNORMALITIES IN FORM

"Among abnormal teeth are included all alterations in form, shape, or structure which have resulted from acquired, congenital, or heredity causes. They will be considered under the following heads:

"(1) Alterations produced by constitutional disturbances—(A) syphilis; (B) rachitis; (C) exanthemata; (D) disturbances of nutrition; (E) use of mercury; (F) gout.

"(2) Alteration produced by local disturbances.

"(3) Gemination.

"(4) Dilaceration.

"(5) Enamel nodules.

"(6) Abnormalities in the number of cusps."

Louis Jack (1832-1914). In the July issue of the *International Dental Journal,* 1893, *Aligning the Teeth,* he says he has used the following appliance for several years with great satisfaction.

"In reference to the alignment of teeth, carrying them in when they are too far out and bringing them out when they are too far in, he uses this plate almost invariably. It is composed of two pieces of vulcanite joined by a band of gold. (Fig. 1.)

"The posterior teeth are made the base of resistance by covering the second bicuspid and the molars of both sides by two separate shoes of vulcanite, which extend at either side of the teeth but a few lines beyond the margin of the gum. To give these shoes strength and to enable the patients to masticate upon them, they are surfaced with gold swaged to the form of the ends of the teeth. These gold facings are vulcanized to the shoes in their proper places.

"Some preliminary preparation of the cast is required to enable these shoes to hold firmly their position. They should go on with a little springiness. The cast is trimmed with a suitable instrument to take a shaving from the teeth at the neck, and also a shallow groove should in most instances be made in the plaster, at the gingival margin. The proper amount of cutting is quickly gained by experience.

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"These bases of support for the movement of the teeth are connected by a narrow band of springy gold, one end of the bar being secured to one of the shoes, the other end being attached to the opposite shoe by a male screw fitting in a screw-cut tube or, with proper precautions, vulcanized into a projection on the outer plate of the shoe.

"The reason for this plan is that by turning the free end of the appliance the bar may be reduced or increased in length. If in any given arch a tooth or more is projecting and others are depressed, the bar is brought into contact with the most prominent tooth, and a piece of elastic rubber is placed between this point of contact; at the same time a rubber ring is carried over each of the teeth which are within the arch and is drawn through a hole opposite the tooth and extended to a button. On the next day the bar is screwed up enough to be again in contact, when a new pressure may be made or the tooth is rested, as the conditions require. If the depressed teeth are sore, they may be rested by tying through the same channel as the ring has passed. Remove these plates daily, each time making a gain in the progress. It is important to make this daily change for the sake of cleanliness, the patient brushing the teeth while the further preparations are being made.

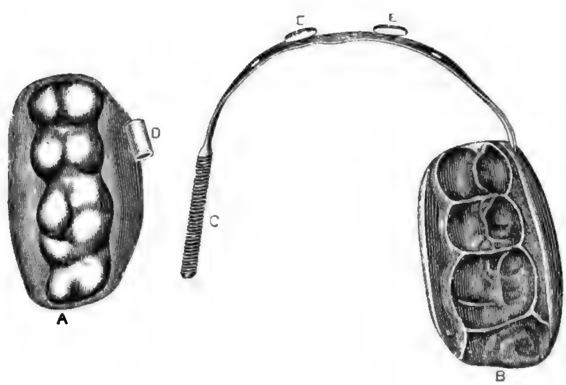

Fig. 1.

"As before intimated, all the front teeth may be moved at the same time either outward or inward.

"Rotation may also be conducted by the various attachments made for that purpose by connecting the rubber band to the attachment, and many modifications of this simple description will occur to meet the exigencies connected with the alignment of the teeth.

"It is also needless to state that the impression of the teeth should be taken with plaster.

"This method may be made useful in the treatment of cases at a distance whenever either of the parents of the child has the intelligence to comprehend the mode of operation of the plate and is capable of applying the required instruction. In this connection he has conducted the correction of a great protrusion of the upper teeth and concurrent depression of the lower arch for a patient living a thousand miles from me, the mother each day making the necessary changes of the plate or ligature. The upper teeth were forced

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backward in the manner described, and when their position was corrected, a similar plate was placed on the lower teeth, when they were gradually brought outward into correct relation with the upper arch. This necessitated but three periods of attention on my part.

"The only originality in connection with this appliance is the division of the old form of upper plate which was used to separate interlocked arches and to connect these by the screw at one end of the bar. He presents this method as comprising many advantages for the purpose for which it is intended, and in this purpose is included the greater number of irregularities we have to treat."

Francis Jean in the June *Odontologie* and January *Revue Internationale D'odontologie,* Paris, January, 1893, states:

APPARATUS TO ENLARGE THE ARCH

"It is an ingenious plate, constructed as follows: Two metallic square rods of one millimeter and a half thick are placed in a parallel direction, each penetrating in a sheath made of the same metal. At the extremity, enclosed in the rubber plate, a piece of metal wire is soldered to each sheath, so as to hold it firm in the plate.

"This little apparatus, when finished, represents, when the plate has been divided in two in the median line, a rod and a sheath fixed each side on the palatine surface.

"The point at which this rod and sheath are to be placed is chosen according to the direction in which the displacement of the arch is to take place. If one wishes to act on the whole palatine surface, or roof of the mouth, from the central incisors to the last molars must be covered by the plate. The extremity of one rod and of one sheath must then be fixed in the center of each half of the plate in wax, and a line drawn in the direction which is to be followed by the saw, in dividing the plate when vulcanized. Now the important part is the mode of action of the plate, which is to separate gradually and mathematically the lateral parts of the apparatus, and to maintain them in that position.

"To do this, the two halves of the plate must be separated one from the other, and a platinum wire of half a millimeter thick is placed around the part of the rod where it comes out of the rubber. This will prevent, when the two halves will be joined together again, the rod penetrating to its full extent into the sheath, so that the two halves of the plate will be separated by a space equal to the thickness of the wire. Every three or four days another turn of a wire is added, and the separation of the plate will be so much increased. This is continued until the desired effect is obtained.

"If only a few teeth, say the bicuspid, are to be pushed out, the plate can be made much smaller, and only large enough to press upon these particular teeth. If to correct the deformity, in addition to the expansion of the arch, one desires to obtain a pressing backwards of the anterior teeth or incisors, a very narrow metallic band is passed in front of these last, the extremities of which band are fixed in the cheek side of the apparatus on a level with the

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bicuspids. In this case the crown of the back teeth is to be covered with rubber, so as to be able to fix the band on the outside."

Safford Goodwin Perry, (1844-1911) in speaking of *Aligning the Teeth, International Dental Journal,* July, 1893, states:

"Cap the bicuspids, and sometimes the first molars, with a simple rubber plate, which is made with a little ridge rising over the bicuspids. Through this ridge a very small hole is drilled and countersunk on the distal side, and then the thinnest saw procurable is passed through the rubber into this hole. A knot is then tied at each end of a very thin piece of elastic, such as is used in place of wrapping-twine for boxes, parcels, paper, etc., and the ends slipped through the cuts into the holes. The knots drop into the countersunk ends of the holes, and so are safe from the danger of chafing the overlying lips. The pressure is varied, of course, by tying the knots closer together or farther apart, as the case may be. When the plate is in place, the elastic is drawn over the front teeth, and if care is taken in drilling the holes in the ridge on the plate at just the right place, the elastic will not ride up against the gum or slip off from the front teeth. This device is the closest fitting and the most comfortably worn of any I have ever used."

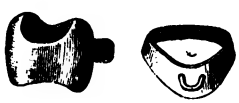

Fig. 2.

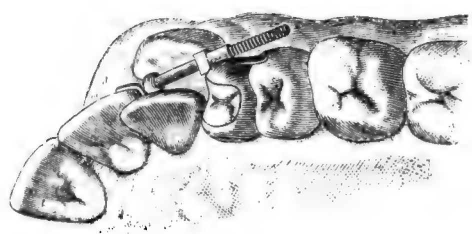

Fig. 3.

Norman S. Essig, in speaking of *A Regulating Case Involving Correction of the Position of the Median Line of the Arch, Dental Cosmos,* June, 1893, states:

"This case, which was that of a boy of fourteen years of age, presents some interesting features. First, as will be seen, the cuspid was completely out of the arch, the lateral incisor and bicuspid being in contact. Secondly, the central teeth were so much to the right of the median line as to constitute a deformity.

"The two objects to be accomplished, therefore, were to correct the center line and bring the cuspid into its proper position in the dental arch. To accomplish this it was necessary to take out the first bicuspid on the opposite side of the mouth, thus leaving a space which, if the median line were moved to its normal position usually occupied by the lateral incisor. After the bicuspid on the right side of the mouth was extracted, an impression was carefully taken, and the model or cast thoroughly dried and well soaked with sandarac varnish. An excavator was then passed around the teeth, cutting away the plaster representing the gum margin, so as to allow the caps to extend a little under the free margin of the gum when the piece was put in the mouth. After this was done, the caps were made for the bicuspid and the lateral incisor, as

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shown in Fig. 2. These were made of twenty-two-carat gold, of about No. 30 thickness, and fitted snugly to the plaster, and in the case of the bicuspid the gold was carried up and just a little over the cusps, as shown in Fig. 3.

"The cap for the lateral incisor was provided with a socket on the labial surface, into which the bar was fitted, allowing of some movement while the teeth were being pushed toward the median line. This cap was also provided with a small arm or lug, which bore against the adjoining tooth in such a manner as to prevent the capped tooth from being pushed out of line while the space between them was being enlarged, and insure the movement of all the teeth bodily toward the left. The nut, which was given one or two turns each day by means of a small wrench, was placed next to the cap on the bicuspid, which was provided with a cylindrical attachment through which the screw passed. The pressure caused by the tightening of the nut lengthened the screw, and thus widened the space for the reception of the cuspid.

"A suitable wrench may be made from a discarded excavator; of course it is understood that no thread is needed inside the cylindrical attachment on the bicuspid cap, as it is desired that the screw as it is passed through should be free to respond to the pressure of the nut. The cuspid came down into place as the distance between the bicuspid and the lateral was widened, and when it was fully erupted a collar of gold was made which fitted up closely to the neck of the tooth, and a small loop of gold was soldered to the labial surface, to which was attached a rubber ligature, which helped to draw the cuspid into place more quickly. The ligature was attached to a little gold button on a small rubber plate.

"After the space was enlarged to receive the cuspid it moved very rapidly, and in its downward course came in contact with the bar or screw, which was then removed and a curved one substituted, which allowed the cuspid to pass inside, thus allowing it to continue on downward into the space prepared for it. The most remarkable feature of this operation was the quickness with which all the teeth responded to the pressure as soon as the force was brought to bear on the lateral incisor. When the median line was brought to its normal position and the teeth on their proper place, the fixture was allowed to remain as a retaining piece for about three months.

"This case was finished about two years ago, and since that time there has been absolutely no change in the position of the teeth, and their regularity is one of the noticeable features of the mouth."

In the April *Cosmos,* he says, *Moving Cuspids:*

"The case selected to illustrate the efficiency of the screw in moving irregular teeth is a cuspid that was not only greatly out of its normal place in the arch, but much turned upon its axis. Here it was necessary to draw it back so that it might be made to assume its place between the lateral and second bicuspid, and at the same time to turn upon its axis. This was accomplished by hooking the bar into a staple soldered well around on that part of the cap covering the labial surface of the tooth.

"An excavator was passed around the molar at that position on the model representing the free margin of the gum, cutting away the plaster from

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around the neck of the tooth, exposing what would correspond to that portion of the tooth or root just above the enamel.

"No. 30 gold, about twenty-two carat, is used and burnished down, forming a cap which fits the tooth perfectly, following the line where the excavator has cut away the plaster.

"If such a band is to be placed upon on incisor or lateral, the face of the cap may be cut out, thus avoiding too much of a display of gold. Thin platinum may also be used, about the thickness of writing paper, and pure gold flowed over the surface after the piece is invested, but it is rather difficult to get the gold evenly distributed over the platinum.

"The first molar, on account of its being provided with three roots, is usually the best tooth to select for the point of resistance, for being reinforced by the bicuspids, it makes it pretty certain that it will not move when the screw is in operation.

"The gold is brought just over the edges of the cusps, and burnished to conform to the contour of the crown; the bar is then put in position, and the loop or rings by which it is attached to the caps, cemented on with hard wax. It is then invested in sand or marble-dust and plaster, and the rings soldered on.

"In making the caps it is better to have them a little loose, as the oxyphosphate with which the piece is cemented in will fill up between the gap and tooth, thus preventing moisture from creeping in under the gold.

"Platinized gold should be used for the bar, as the thread is not so likely to strip, and it can be made of thinner wire.

"When the piece is finished we have a fixture which will exert a force in a given direction sufficiently strong to move any tooth in the mouth; and while the force is not a persistent one it is positive and certain, and unaccompanied by any inflammation or soreness.

"Some members of the profession, who saw this piece before it was put in the mouth, expressed the opinion that the molar to which the fixture was fastened as a point of resistance, and also the bicuspid, would move before the cuspid did. The result showed, however, that this was not the case. The cuspid was not only brought back, but turned on its axis."

B. H. Catching, (1848-99) *Regulating Appliances, Catching's Compendium of Practical Dentistry,* page 191.

"This represents cases frequently seen, including superior lateral incisors. The cut is of the teeth of a robust young man, strong and firmly planted in the jaw. Without extraction the appliance moved the adjoining teeth laterally and brought the malposed tooth into position in two weeks. The same appliance was used as a retainer. No plate or caps were used to separate the jaws so as to allow the malposed tooth and its antagonist to pass. The patient operated the appliance by using a wrench, and had instructions to tighten the screw to his bearing capacity just before retiring at night. In this way, when the cutting edges of the opposing teeth came together, the upper was easily thrown outside the lower.

"Material used, German silver wire, solid and hollow. A thin band is made

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to pass behind the malposed lateral and between the two adjoining teeth; to the end of this, resting on the cuspid, as shown in cut, a piece of hollow wire is soldered, in which threads are cut to accommodate the screw; on the other end, resting on the central incisor, a piece of hollow wire, with the outer end closed, is soldered; this acted as a socket into which the end of the screw without threads entered. A piece of hollow wire, as shown right over the malposed tooth, is soldered to the screw bar and filed square, so as to engage the wrench. When the screw became exhausted, the band under the malposed tooth was cut, lapped and soldered."

R. Ottolengui, Dental Cosmos, November, 1893, before the *New Jersey Dental Society,* read the following:

"Ever since I first entered upon the practice of dentistry, I have heard, ever and anon, the cry go up against the rapid regulation of teeth. 'Move teeth slowly, and avoid the danger of destroying the vitality of a pulp,' has been the warning. By some, and I believe by many, this danger to the pulp has been claimed to be greatest when torsion of a tooth is the movement attempted. It is this idea I shall endeavor to disprove.

"The death of a pulp is probably caused, when it occurs during regulation of teeth, by the production of a pericementitis in the vicinity of the foramen, which impairs the nutrient supply of the pulp, which in turn results in inflammation of pulpitis, followed by its death. The pericementitis is occasioned by a pressure in one direction, which causes an absorption of the impeding tissues more rapid than the progress of repair of the tissues from which the tooth is receding. The idea of rapidity, as affecting this result, can have but one connection with this process, and that is as it applies to the distance to which the tooth is moved. This is evident, for the shorter the distance through which the tooth is moved, the less can one logically complain of the rapidity with which the tooth is moved, the less can one logically complain of the rapidity with which it is accomplished. For example, a tooth is moved when a silk is pressed between two contiguous teeth, yet it would be folly to claim that to pass a silk rapidly would be more dangerous than to do it slowly. I cite so extreme a case to reduce the proposition to the ridiculous, the *reductio ad absurdum* method of mathematics.

"Hence it follows that it is dangerous to move teeth rapidly only when they are to be moved a considerable distance. Before passing from this, I will say, parenthetically, that the foregoing is not the only way by which a tooth-pulp may be made to die during the regulation of teeth, but it is probably the explanation of devitalization resulting from the too rapid movement of teeth, which is the subject under consideration.

"If it be true that the danger of rapid movement is in proportion to the amount of movement, I have but to show that in the act of torsion a tooth is but slightly moved, in order to support my theory that teeth may be twisted rapidly with little if any danger. And when it is remembered, as it should ever be, that any regulation of the teeth which covers a long period of time becomes a distinct strain upon the nervous system of the child, one sees at a glance that, where it can be done safely, the most rapid movement of teeth is the best and only method which should be adopted.

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"It is my intention to show you a typical example of the several conditions wherein torsion is required, and to point out the amount and direction of the movement. But first I will call your attention to my methods.

"It is well known that to rotate a tooth in its socket, it is necessary, in some way, to produce a pressure which will act upon one corner in one direction, or else upon both corners in opposite directions. Numerous devices for this purpose have been employed.

"My method is to band the teeth with gold, having one or more hooks upon the band, as may be required for the individual case. This band is made very easily. I use pure gold plate of 28 gauge. Having cut a strip as narrow as possible for my purpose, I bent it approximately to shape with the ends turned up at right angles. This loose open band is slipped over the tooth, and not carried much beyond the cutting-edge. The ends are then caught with the serrated beaks of a pair of pliers, and drawn tightly together, which produces a tight-fitting band, except that as the palatal surface of the central incisor is concave, the band will pass straight across that surface, leaving a space. Later, however, when the band is set with cement, and pressed farther up, so that it impinges upon the bulbous part of the tooth, it becomes more accurately adapted; the loose ends are united with a tiny bit of solder, and then turned down to form the hook. When I need two hooks, I begin with two strips soldered together, and when the loose ends are united, I bend extensions to form my two hooks. The bands are cemented to the teeth, and so are permanently fixed until the rotation is completed. With a central incisor banded in this fashion, if a rubber ligature be thrown over the hook at the anterior labial corner, carried backward and attached to some fixture within the mouth, the anterior corner of the tooth will be carried in. If, however, the ligature attached to the same hook be carried around the palatal side of the tooth, and outward around the posterior corner, to be attached to a fixture outside of the arch, the result will be a rotation which will carry the anterior corner inward and the posterior corner outward at the same time. A similar result obtains when the ligature is hooked on the posterior palatal hook, then carried around the labial surface and inward around the anterior corner, to be attached to a hook within the mouth. The selection of either of these methods would depend upon the class of fixture used, that is, whether there be an external band or not. Next, the posterior corner alone may be affected, by carrying the ligature from the posterior palatal hook outward to a band, carrying the corner out by its action.

"The cuspid is probably the most difficult tooth to twist, yet it can be accomplished. I make a gold cap for this tooth, upon which I have my hooks for attachment of rubbers. This cap, like the band for the centrals or laterals, is made at the chair, without recourse to dies or models. I cut my gold into a shape similar to an hour-glass. When doubled by bending across its shortest diameter, we already have an approximate cap. This is slipped over the tooth, and burnished to it, after which the open edges are soldered together. An accurately fitting cap can be made in this manner in a few minutes without going to the laboratory. The books are formed of a round wire, the ends being pelted to form knobs, and then soldered across the cap. This allows all

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the variation of attachment of ligatures and direction of rotation described in connection with the incisors.

"I pass now to the consideration of specific conditions. I may say that all forms of irregularity may be classified as belonging to three groups. First, where the anterior corner alone must be moved; second, where the posterior corner only needs change; and third, where both corners are in abnormal position."

Dr. Ottolengui further explained his method and appliances for regulating teeth, and illustrated, by means of movable diagrams, the gradual movement of the teeth in the operation of regulating. These explanatory remarks would be but imperfectly understood in the absence of the diagrams, and are therefore omitted.

Dr. C. L. Boyd, (*Ohio Dental Journal,* July, 1894) states:

"The writer takes the position that lack of development of the maxillae is the first potent factor in crowded condition of the teeth. He says a system of mouth massage will accomplish much in enlarging the arches, and suggests that mothers and nurses be instructed in gentle and persistent rubbing of the inside of the infantile jaws."

Dr. H. E. Cutter, (*International Dental Journal,* June, 1894) on *Drawing the Lower Jaw Forward,* states:

"The patient was a girl eleven years of age. The upper arch was narrow and pointed, with the front teeth very prominent. The lower arch was regular, but the front teeth were elongated in comparison with the bicuspids, so that their cutting-edges almost touched the gum behind the upper incisors. The upper centrals projected fully a quarter of an inch beyond the lower teeth. The upper and lower cuspids, however, almost touched each other. When the mouth was at rest, the lips did not cover the front teeth, so that the face had an unpleasant expression. The profile was even more uncomely, for, besides the projecting teeth, the chin was receding, and seriously marred what would otherwise have been a fine face.

"It is important to make a careful study of the general outline of a patient's face, as well as of the teeth, before beginning any corrective treatment. And we should take into consideration the teeth and facial expression of the parents of the patient, in order that we may know what is likely to be the natural development in the child. If this were more frequently done, we should have more satisfactory results. By recognizing a family tendency to a deformity at an early age, a simple method can often be successfully employed to prevent its development. Another patient might have a set of teeth very similar to the one before us, and yet an entirely different treatment is required. In the one case the deformity might be due to a receding lower jaw, but in the other to a projecting upper jaw. The first and most important question in cases of this kind is to decide at the outset whether it is the upper or lower jaw which requires treatment, for upon this success or failure largely depends.

"Before undertaking a case of this character, one should first satisfy himself that the patient is one who will willingly undergo some unpleasant requirements. For there is occasionally a person who is very anxious to

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undergo treatment, and for a time he faithfully follows the instructions given; but gradually he becomes indifferent and careless, and the treatment of the patient has to be abandoned.

"In the case before us it was evident that the lower jaw could not be carried forward without first expanding the upper arch. This was done by means of a thin rubber plate, into which was vulcanized a German silver jack-screw. To hold the width which was thus gained, and at the same time to flatten the arch, another plate was made. A spring German silver wire was bent around close to the outside of the teeth, with its ends embedded in the plate at the sides. From time to time the wire was bent so as to bear hard on the mesial edges of the centrals, and thus the arch was gradually flattened.

"This being done, the next step was a more difficult one, which was to lengthen the bite and at the same time draw the lower jaw forward.

"This plate was made thick over the bicuspids and the first molars and behind the front teeth. Deep depressions were made in the plate a little forward of the places where the cusps of the lower teeth would naturally touch the plate. The result was that the patient began to carry the lower jaw forward a little, so that the teeth would enter these depressions.

"It was found, however, that a plate which covered the bicuspids and first molars prevented these teeth, both in the upper and lower jaws, from elongating and forming a new articulation to correspond with the lengthened bite. Therefore another plate was made for the upper arch. This one was thickened only behind the front teeth, where depressions were made to receive the points of the lower incisors. No other teeth of the lower jaw were allowed to touch any part of the plate. This plate was held firmly in place by wire clasps encircling the first molars. There was also attached to this plate a wire which passed around the outside of the front teeth to keep them in the flattened position which they had assumed.

"In making this plate much care was required to have the depressions in just the right places, and of exactly the proper depth.

"A wax and paraffin base-plate was fitted to the plaster model of the upper arch. To the part where the plate was to be thickened soft yellow wax was then added. While the wax was soft the base-plate was inserted in the mouth, and the patient told to throw the lower jaw forward and bite into the wax, thus determining how much the jaw was then to be carried forward and the bite lengthened. This was an important question, for a slight variation at this point might have produced an unfortunate result. Several plates of this character were made, as the amount to be gained had to be gradually accomplished.

"When the case was begun but one second molar had begun to appear; when the work was completed, all four of these molars had erupted and interlocked with each other. The result was that the patient could comfortably bring her jaws together only as they had been newly related.

"All that then remained was for the bicuspids and first molars to complete their articulation, which they are doing.

"It was necessary to carry the lower jaw forward while the second molars were erupting, as the retaining of the jaw in the new position depended en-

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tirely on the articulating of these teeth. Unless the operation had been undertaken at just this time, it is doubtful if it could have been accomplished. It would not have been possible to secure the retaining of the jaws in the relation they now are had the attempt been made at an earlier or a later time.

Dr. T. F. Chupein, (*Dental Office and Laboratory,* July, 1894), *Attaching Regulating Appliances.*

"Sometimes, in making a vulcanite crib or covering over the bicuspids and molars to be used as a buttress or point of resistance for the jack-screw to press against, this crib drops off or loosens, thus defeating the object. We have found that they may be made to hold securely by lining the entire surface with moderately thin oxyphosphate cements, wiping the tooth dry and forcing the crib in place. After it has set hard the pressure on the jack-screw may be applied with no fear of its coming off or getting loose."

DRAWING DOWN AN UPPER CENTRAL

In the case of Drawing Down an Upper Central he reported a case of a superior central incisor broken off, but left long enough to be brought down in regular order with the other teeth.

"A cap of gold was made to fit the broken tooth. For the two adjoining teeth, saddle caps were made. A bar extending from one to the other of these caps was soldered to the ends of them, a hole was drilled in it over the end of the fractured tooth, to admit a screw post, which was adjusted and soldered to the cap of the fractured tooth. The appliance was set with cement, and a tap was placed on the screw post, which, on being turned, tracted the short tooth. The elongation was accomplished in about five days. As a retainer, thin caps were made for the three teeth; to them was soldered a bar on the labial surfaces; these were cemented in position."

Again in the September number of the same Journal we find in speaking of *Protrusion of the Upper Teeth Regulated:*

"Deformities of this kind produce a great disfigurement of the countenance, and when unsightliness is rectified so as to produce a harmony, the aid of all parents should be enlisted in the work.

"A correct impression of the upper and lower teeth is taken, with modeling compound, to serve as a history of the case, and the two models made from these are placed together to show the natural articulation. A plaster of paris impression is taken of the two central incisors, and after the sides of this are luted, crown, or low melting fusible metal, is poured into this impression. This gives a correct die of the front teeth, over which a gold cap may be accurately fitted, by burnishing pure gold of No. 30 or 32 gauge, to it, after having first made a thin lead pattern of the cap.

"The cap made, two little hooks or headed platinum pins, such as may be made by breaking an old vulcanite tooth and using the pins from it, are soldered to it on each distolabial edge.

"We next proceed to bend, in the mouth, around the first molars, two thin German silver bands. This is done by passing the metal, which should be about one-eighth of an inch wide, around these teeth, and drawing it tightly

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against the tooth by seizing the ends with a pair of flat-nose pliers. The band thus formed is carefully removed from the tooth and heated red hot while held by the pliers. By doing this, when the pliers release their hold of the ends of the band, the metal being changed by the heat, will not spring away, and they can then be accurately soldered together. The band thus formed may be placed on a wooden stick or tapering mandril, and the ends which have been soldered may be filed, or the soldered ends may be bent backward so as to form a hook.

"These preliminaries accomplished, the cap is cemented to the two front teeth with phosphate cement, and the bands also cemented to the molar teeth. It may be a valuable precaution regarding these molar bands to solder a small tick, at some suitable point, to them, and when they are cemented to the teeth to bend the tick over the masticating surface to prevent the band working up to the neck of the teeth, burying itself in this tissue, and causing intolerable pain.

"The bands and caps being adjusted, as shown in Fig. 4, elastic bands

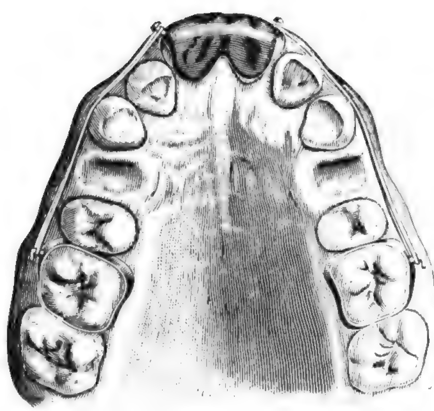

Fig. 4.

are hooked over the pins or hooks of the cap and stretched back and hooked over the molar bands.

"We omitted to say that in order to obtain room for the backward traction of these teeth, the first bicuspids were extracted.

"It might be found that the elastic bands, after having been worn a week, lose their strength or elasticity, in which case they should be changed weekly or oftener. The progress is slow, but as the appliances give little discomfort, is therefore no impediment to mastication, or to the proper cleansing or brushing of the teeth; the time consumed is not of much moment.

"Should the elastic bands slip down and bury themselves into the gum, this may be rectified by placing a little hook over the eye-teeth, which will lift it from the gum, and hold it in position by the resilience of the rubber. Such a hook is formed of a piece of plate, snipped by the shears so as to make two ends on one side, and a single end on the other; to the single end the hook is bent, while the two extensions are pressed over, in order to let the point of the eye-tooth protrude."

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Grant Mitchell (*Ohio Dental Journal,* February, 1895), ***Enameling Retaining Appliance:***

"After the teeth have been regulated, making the retaining bands of platinum plate of suitable gauge, solder with pure gold, coat the labial surface with properly shaded enamel, and bake."

George Cunningham, (*Dental Record,* London, 1895), ***Luxation or the Immediate Method of Treating Irregular Teeth.***

"Many interesting cases treated by the author after this manner are illustrated. His *modus operandi* is as follows:

"All the teeth should be thoroughly scaled, cavities filled, and an alcoholic saccharin wash used several times a day before operation.

"On the day of operation. Brushing the teeth and bathing them with saccharin wash—better with H_2O_2 than H_2O for dilution—same wash after the operation and frequently next few days.

"It is well, except in the simplest cases, to have studied a model, making the rearrangement of the teeth on a duplicate model. If a splint can be prepared from this ready for use immediately after the operation, so much the better.

"All being ready, cut the alveolus with a thin circular saw, ⅞ inch to 1¼ inch in diameter, not thicker than thin note paper, into such sections as are necessary. This is quickly done, and can be borne quite frequently without any anesthetic. Forceps, elevator, or other instrument is used for pushing, pulling, or rotating the tooth sections into place. Forceps should have the beaks guarded. I use copper sheaths molded and soldered so as to fit the beaks fairly tightly. Rubber sheaths, soft or hard, will also do. Dr. Bryan's special forceps with curved support for bringing a tooth inside the arch into line seems well adapted for this purpose. Moving teeth backward or rotating teeth out of line into the arch is much facilitated when a badly carious neighboring tooth is extracted. This extraction may be done at the time, but possibly better two days or so previously, as the local postoperative inflammation facilitates the bending and movements of the alveolus. In such cases the sectionizing of the tooth and its alveolus may be done with a pair of surgical bone cutters, or even with Physick forceps. The wedge-shaped beaks of the latter are extremely useful when it is necessary to push the teeth backwards. The movement of the tooth or teeth into the desired position may be very easy, but often requires great strength carefully applied. One to six teeth have been so moved. The chief point in the operation is to move each tooth with its socket entire as far as that may be possible.

"The teeth when in position should be ligated with silk or thin silvered steel wire, preferably the latter, or fixed in a splint. Thin German silver or platinum bands soldered together make a good splint.

"Care must be taken in closing the teeth, as the articulation is almost certain to require adjustment by disking, etc. Carborundum wheels work quickest.

"When finished, syringe thoroughly with peroxide, saccharin wash, especially any pockets or spaces marking the previous position of the moved teeth.

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Paint all the bleeding or cut surfaces with Richardson's styptic colloid. To a saturated solution of tannic acid in alcohol and ether (equal parts) pyroxylin (gun-cotton) is added, as the liquid will dissolve (tannin collodion preparation). The pain has usually subsided by this time and the patient feels fairly comfortable. The patient should be seen next day in case the teeth have moved —syringing, styptic and cleansing, as before. If possible, continue this treatment for the next few days, the patient always using the wash after meals. In a few cases new ligatures may be unnecessary; ligatures should be renewed or dispensed with as required by the indications. A period of three or four weeks is usually ample time for retention by ligatures or splints."

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE SIZE OF THE INFANTILE PALATE*

By B. S. Denzer, M.D., New York City†

ONE of the lessons of the Great War that we shall probably forget, as we have forgotten other lessons, is the importance of the liaison officer. In principle the duties of this officer were to keep the various departments of the army in close touch with one another and so to co-ordinate their activities that they might reach a common goal with the least effort and friction. We can hardly expect that the medical and dental professions which have nearly a common goal, ever will be so organized that this fine degree of cooperation will be realized. This is particularly to be regretted because there are many problems that might be attacked best by the combined efforts of men working in very different specialties. It is as if each group were interested in tilling its own field and that the borderland fringe where one property merges into another is uncultivated. The subject about which I am to speak is on the fringe of my own special interest—pediatrics. Indeed it is possible that I have wandered too far afield and I may be in regions strange to me but quite familiar to you. If so, I am sure that I shall receive your kindly and not too critical guidance.

It may be worth while to trace the course of my interest in the infantile palate because it began as an intensely practical problem. From time to time I have been seeing children operated upon for the relief of nasal obstruction, whose lips could not possibly close because of misshapen jaws. In reading your texts on orthodontia for any explanation of the occurrence of these malocclusions, I unconsciously reclassified the theories as to causation into two practical groups—those theories that referred to causative factors beyond our control, congenital conditions and hereditary tendencies, and those that

*Read before the Annual Meeting of the New York Society of Orthodontists, New York City, April 12, 1922.

†Pediatric Service, The New York Nursery and Child's Hospital and the Department of Pediatrics, Cornell University Medical School.

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referred to acquired conditions such as neglect and early removal of deciduous teeth, rickets, malnutrition, thumb sucking and particularly tonsils and adenoids. Is the latter group—the acquired conditions—a dominant factor in the cause of large numbers of cases of malocclusion and if so, how early in life do they distort the shape of the jaw and palate? The problem appealed to me as one of practical preventive therapy. If preventable conditions such as adenoids and rickets in infancy lay the foundation for malocclusion in later childhood, then prevention or cure of these conditions may obviate a number of cases of malocclusion. As many of the conditions mentioned occur during the first two years of life, infancy became the critical period for study.

The plan was to measure the palates of groups of infants with rickets, large adenoids with mouth-breathing, etc., and to compare these measurements with those of normal infants of the same age. The existence of a standard of the size and shape of the normal infant's palate was a prerequisite for carrying out this plan. To my surprise only one reference to the size of the living infant's palate could be found. I decided, therefore, first to fill this hiatus in our knowledge and measure a number of infantile palates. The comprehensive plan of studying the jaws of cases of rickets and other conditions has not been carried out and so many other interests and duties have arisen since the beginning of this work that I fear the final goal will not be reached by me. Nevertheless the preliminary work on the normal infant seems to be worth recording, first because it establishes a standard with which the abnormal may be compared, and second because it demonstrates a satisfactory method of measuring the infantile palate.

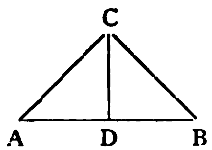

Fig. 1.—Alkan's method of measuring height of palate: *A-B*, width of palate; *A-C* and *B-C*, distance from alveolar margin to raphe: *C-D*, height of palate.

The only measurements of the infantile palate that could be found in the literature are those of Alkan, who examined the palates of thirty-six newborn infants. The method of mensuration used by Alkan seems rather crude and the criteria of the shape and size of the palate appear ill chosen. The width was obtained by placing the arms of a compass on the alveolar margins, removing the compass from the mouth and measuring the spread of the compass on the straight rule. "The width of the palate was measured in only one place, which corresponded to about the mid-point on the alveolar arch." Alkan himself referred to the greater accuracy of plaster casts; indeed it must be quite impossible to determine exactly the mid-point on a tiny infant's arch, even if the mechanical difficulties of manipulating infant and compass are overcome. Furthermore, the reasons are not clear for choosing this part of the alveolar arch. The mid-portion of the alveolar arch does not correspond to any fixed anatomic point (as does the position of the molars or the premolars in the second dentition), nor does it represent an absolute value, such as the greatest width or the greatest height. Alkan measured the height of the palate indirectly by constructing a triangle, measuring from either alveolar margin to the median raphe. Thus from the three sides of the triangle he calculated the height of the palate by measuring the line dropped

from the apex of the triangle (the raphe) to the base line (the width of the alveolar arch). (Fig. 1.) This technic involves the removal of the compass from the mouth in measuring each side of the angle. It is difficult to conceive how, in measuring the two sides of the triangle, one could find the same points on the alveolar margin and the raphe, a procedure which accurate mensuration demands.

When I presented the problem to my former chief, Dr. Schloss, and mentioned the difficulties of measuring the palate he advised me to seek out one of your number for assistance. The application of engineering methods to ortho-

Fig. 2.—Surveying apparatus. (Stanton.)

dontic problems is so well known to you that it is unnecessary for me to enter into either the principle or the practice of this means of mensuration. With the assistance of Dr. Stanton and his associates I was able to obtain faithful impressions of the infantile palate, to pour stone casts and to submit them to accurate measurement with his surveying apparatus. This solved the problem of technic. (Fig. 2.)

Only the question of the criteria for judging the shape of the palate remained. The greatest width and the greatest height seemed to be the most significant measurements. The greatest height was chosen because the high

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palate is one of the supposedly characteristic features associated with changes due to malocclusion and mouth-breathing in older children, and this measurement would serve as a basis for comparison. The greatest width was chosen rather than the width at any fixed distance from the frenum because there are (Fig. 3) no anatomic landmarks on the infant's jaw that bear any logical relationship to the height or the later development of the palate. Furthermore, the greatest width like the greatest height is an absolute and not a relative figure. It is customary for purposes of comparison to express the relationship of height to width by the index $\frac{\text{Height}}{\text{Width}} \times 100$, and this formula has been followed.

Thirty-nine children under 1 year of age were studied. Most of the cases were taken from the "feeding" service of the New York Nursery and Child's Hospital—a ward in which ill nourished infants, foundlings and infants awaiting adoption are cared for. Thus, although a few showed

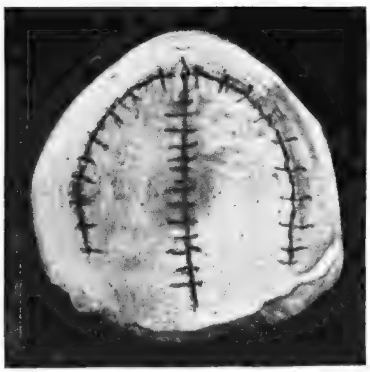

Fig. 3.—Dental stone cast of palate. The points surveyed have been made heavier to permit of photographic reproduction.

normal weights, most of the infants were under weight; many were mildly rachitic but none severely so.*

Table I gives the average for all the cases. The greatest width is 30.9 mm. and the greatest height, 8.79 mm. The $\frac{\text{Width}}{\text{Height}}$ index is 28. Table III indicates that the variations according to age fall within narrow limits. The average palate of the infant from 6 to 12 months of age is a little broader, but no higher than that of the one month old baby. The palate of the heavier child bears a similar relationship to that of the lighter (Table IV) but it is impossible to determine whether this difference is due to increasing age or weight.

It would be futile to compare these measurements with those of Alkan for reasons already indicated—the difference in technic and the fact that Alkan measured not the greatest width and the greatest height but the width and height at the mid-point of the alveolar arch. The normal $\frac{\text{Width}}{\text{Height}}$

*The group is as nearly normal as can be found in hospital practice.

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TABLE I

AVERAGE DIMENSIONS OF PALATES OF CHILDREN UNDER 1 YEAR

Numbers Cases	Greater Width (Average), Mm.	Greater Height (Average), Mm.	$\frac{\text{Height}}{\text{Width}}$ index (Average)
39	30.9	8.79	28

TABLE II

DIMENSIONS OF PALATES OF ALL CHILDREN STUDIED

Age	Case Number	Weight	Greatest Width	Greatest Height	$\frac{\text{Height}}{\text{Width}}$ index
3 months	12	$8\frac{10}{16}$	32.5	8.7	27
4 weeks	29	$6\frac{10}{16}$	27.5	8	29
4 weeks	25	6	29	8	27
12 days	10	$8\frac{12}{16}$	30	11.3	37
6 weeks	30	$5\frac{10}{16}$	28.5	8	28
6 weeks	31	6	30	9.9	33
6 weeks	22	$9\frac{8}{16}$	30.5	9.6	34
7 weeks	14	$6\frac{10}{16}$	28	7.4	26
2 months	13	7	28	9.5	34
2 months	41	14	27	7.7	28
2 months	23	$8\frac{10}{16}$	31	10.1	33
2 months	19	$4\frac{8}{16}$	28.5	7.5	26
3 months	9	.....	32	7.4	33
3 months	12	$8\frac{10}{16}$	32.5	8.7	27
4 months	8	11	33	9.7	29
4 months	16	12	32	9.4	29
4 months	21	9	30	8.7	29
4 months	7	11	34	9.5	28
4 months	3	$10\frac{2}{16}$	32.5	10	31
5 months	43	9	32	8.2	26
5 months	44	10	30.5	10	33
5 months	4	$9\frac{8}{16}$	30	8.6	28
5 months	5	$12\frac{8}{16}$	28.5	9	32
6 months	34	$9\frac{6}{16}$	31.5	9.6	30
6 months	36	11	30.5	8.6	28
6 months	35	7	28.5	7.2	26
7 months	15	$8\frac{6}{16}$	31.5	7.7	24
7 months	6	9	30	8.7	29
7 months	33	10	32	8.1	29
8 months	42	$17\frac{12}{16}$	33.5	8.3	25
8 months	45	9	31.5	9.9	25
9 months	28	17	35	8	34
9 months	38	14	32.5	7.1	23
10 months	37	19	36	9.3	23
11 months	26	$12\frac{10}{16}$	30	9.5	26
11 months	40	17	34	9.4	28
11 months	39	13	33	8.1	25

index for adults according to Bloch falls between 44 and 58; that is to say the infant's palate is broad and flat and the adult's is comparatively high and narrow. Whether the measurements of the infantile palate have any significance in relation to the normal palates of older children or to the palates of children with malocclusion is a question that I am not competent to discuss.

If I may be permitted to pass judgment on my own work however, I should suggest that its significance lies not in the meagre results obtained but in that the same method of attack applied to those pathologic conditions

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TABLE III

AVERAGE DIMENSIONS AT DIFFERENT AGES

Age	Number of Cases	Greatest Width (Average), Mm.	Greatest Height (Average), Mm.	Height/Width index (Average
1 to 3 months, inclusive	13	29.4	8.7	28
4 to 6 months, inclusive	12	31	9	29
7 to 11 months, inclusive	11	32.6	8.5	26
	39*	30.9*	8.79*	28*

*Average dimensions in children under 1 year.

TABLE IV

AVERAGE PALATAL MEASUREMENTS OF CHILDREN CLASSIFIED ACCORDING TO WEIGHT

Weight	Number of Cases	Greatest Width (Average), Mm.	Greatest Height (Average), Mm.	Height/Width index
Under 10 pounds*	19	29.9	8.7	29
Ten pounds and over†	15	32.5	8.9	27

*Average age 3½ months.
†Average age 6⅔ months.

suspected of a relationship to malocclusion would yield data of great value. Let me cite an example of the kind of problem that such an investigation might solve. It has been stated by a well-known physician that failure to remove hypertrophied adenoids "before the sixth month leads to the development during the first year of the short upper lip, and the narrow high vault, which are associated with the adenoid face." I am not holding a brief either for or against that statement. However, I doubt very much whether it is possible to decide upon the narrowness or height of the infant's vault merely by glancing at the mouth. If it is true that hypertrophied adenoids lead to the development of the high vault before the end of the first year, then we are derelict in our duty in not removing all hypertrophied adenoids early in life. If it is not true, then the supposed high vault cannot be used as an excuse for adenoidectomy. The solution of the problem, something more than a mere expression of opinion, lies within our reach. The measurement of the palates of a series of infants with large adenoids and mouth-breathing and a comparison of the height-width index with the normal would be definitive.

The effect of other conditions on the shape of the jaw might be studied in similar fashion. It would be most interesting if the inmates of our large infants' and children's asylums could be investigated in this way. The changing shape of the jaw could be followed over a period of years in normal children and in those suffering from the conditions mentioned. Such data would afford most valuable proof of the rôle played by rickets, adenoids, bottle feeding and the like in the causation of malocclusion. I realize what a colossal task this would be, but it would be worth while. It would demand a close liaison between hospital administratives, orthodontists and physicians. It would mean quitting the center of your own field and cultivating with your neighbors the borderland fringe where the interests of both of you touch and fuse. It is a task worthy of cooperative effort.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By

Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

ENCOURAGING THE USE OF THE X-RAY MACHINE BY THE INDIVIDUAL DENTIST*

By Dr. J. D. McAlpin, San Francisco, Calif.

THE subject which I have chosen is one to be considered from many angles. Although it is impossible for me to cover it thoroughly, I will endeavor to bring out a few thoughts for your consideration.

It is a fact well recognized that every dentist in the United States now realizes the value of the x-ray, and if called upon for his opinion he will say that the time has come when the use of the x-ray in dentistry is indispensable. It seems, however, that the principal question is how are we to obtain dental radiograms in the most efficient and economical way. Let us first consider the commercial x-ray laboratory as we now know it. For a few dentists located in the cities there are x-ray laboratories in the same building, perhaps on the same floor, other dentists send their patients out of the building and at times across the cities, while still other dentists in the small towns are compelled to send their patients into the cities to have their radiograms made.

In any of the above cases noted it is almost impossible to give a real efficient and scientific diagnosis as it is between twelve and twenty-four hours before the dentist receives the radiogram, unless the dentist is willing to depend upon the diagnosis of the radiographer, who at the present time I am sorry to say is usually a layman. The above is only one of the many inconveniences the dentist meets with in sending his work to an outside radiographer.

Now let us consider the dentist making the radiograms in his own office and its advantages. Why has not the average dentist an x-ray machine in his individual office? There are four principal reasons, any one of which will sufficiently answer this question. The first is, the expense of installing an x-ray machine, the second, the time consumed in making the radiograms,

*Read before The American Society of Dental Radiographers at Los Angeles, Cal., July 19, 1922.

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the third, lack of floor space necessary to install the equipment, and fourth, the lack of knowledge of the technical work and interpretation of the radiograms.

I will read a short tabulation prepared by Dr. Henderson. This tabulation is a very concise and pointed answer to the first two reasons mentioned above. Dr. Henderson says in part that he is engaged in the practice of general dentistry in a small county seat and his report covers a period of twenty-five weeks. The report is tabulated, giving the number of minutes consumed in taking the number of radiograms and giving the financial returns for this work. The report begins October 5, and closes March 26. The total number of minutes consumed are 430, the total number of exposures made are 130, the financial returns are $258.50. Dr. Henderson has figured his investment on a basis of $725 at 7 per cent, which is $25.37. The cost of films is figured at $6. The salary of his nurse, at 50 cents an hour while she is actually engaged in handling the radiograms is figured at $7.58. The cost of dental mounts is $4.05. The cost of developing is given as $1.39, making a total expense of $44.30. This gives a net return of $214.20, and after computing on the per hour basis actually consumed in making and handling the radiograms, Dr. Henderson's income is $29.09 an hour.

Referring to the expense of installation, there are x-ray outfits on the market at the present time which sell for as low as $575 which are complete, and these outfits can be purchased on terms of $35.00 a month. I believe this completely covers the first two reasons.

For the third reason, the lack of floor space necessary to install the equipment. The x-ray outfit above mentioned covers an area of seventeen and one-half square inches, it is mounted on castors, is freely movable, and can be attached to any 110 volt, A.C. current, and is so constructed that when not in use the tube arm can be extended upwards and the seventeen and one-half inches above mentioned is all the space necessary to allow for the machine.

The fourth reason, lack of knowledge of radiographic work, and the interpretation of the radiograms is the most important subject to be considered at this time. The technic of operating the machine and developing and finishing the radiograms is very simple and can be learned in a very short time, after installing the machine.

I do not feel that it would be too broad a statement to make, to say that dental radiography is as indispensable as the practice of dental science today. It seems that we should have some definite technic of making and reading our pictures. Suppose, for instance, we classify our tissue in Classes 1, 2, 3, 4, and 5, Class 1 to be known as the cheek and gum tissue, Class 2 as the alveolar process, Class 3 as the root, Class 4 as the crown, Class 5 as the filling materials and metals.

We would then start to read the radiogram from the free margin of the film first which is the cheek, then the gum, etc. If we find that the free margin is not properly exposed or developed, we at once know that the picture is not going to give us the proper detail in any part, regardless

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of the angle from which it was taken. This will I believe convince you that the average record kept of bone reconstruction is not accurate because of the possibility of burning out the detail or the lack of some technic of the first and subsequent pictures; for instance, most of those present have been called upon to read radiograms for others in the profession and at a glance you were able to detect the lack of development or the use of too hard a ray.

As an illustration, in a clinic last week, several of us were discussing radiographic check-up work and for demonstration we made a picture of an upper lateral which we knew to have a large area at the apex. This first picture was made at the proper angle with the proper back-up and gave us full detail. The apex was then amputated and all necrotic tissue curetted and immediately another picture was made with the back-up six inches and 35 milliamperes with just a slight elongation, therefore a great deal of the detail was burned out and the condition looked as though new bone had been built in. This is only one of the many cases which prove that it is necessary that each and every dentist should learn more of the real principles of radiography, and I believe the only way is to put in some of our time in learning to operate our own machine, thereby saving time for ourselves, and inconvenience and suffering for our patients.

DISCUSSION

Dr. Clarence O. Simpson.—It is easy to discuss Dr. McAlpin's paper because I disagree with most of the points presented. Had he said that the use of the x-ray was indispensable to the practice of dentistry, there would be no argument. What he said, every dentist in the United States realizes the value of the x-ray and considers it indispensable, he is charitable but more than half wrong. Perhaps the standard of practice in San Francisco is exceptionally high, but generally about 75 per cent of dentists either do not use the x-ray or only occasionally as a last resort. One does not have to go outside of the cities to find this proportion either.

If possession of radiographic equipment would result in its efficient use, it should be made compulsory, but this is no more true than the possession of the necessary instruments results in the efficient practice of prophylaxis. The manufacturers and dealers are spreading enough sales propaganda without this Society starting a campaign. We have a more useful field in improving the practice and developing the science of oral radiography. All dentists who cannot obtain competent radiographic service conveniently should install equipment and learn to properly use it. Other dentists will find it to their financial and professional advantage to refer the work to a specialist. This is not merely an opinion, but it is founded upon more convincing evidence than that quoted from Dr. Henderson. There is no doubt about a dentist's making an x-ray machine profitable if that is his sole motive. He could do the same with loaded dice. The question is, will it be profitable if his motive is the best service?

There are some questions which might be submitted to Dr. Henderson before accepting his calculations. Did he encounter any nervous, "gagging," or loquacious patients in his average record of 3½ minutes per radiogram? Was all of his time productive in other operations excepting the 3½ minutes? How does he obtain an average fee of $2.00 per film including those which are worthless (if the suggestion is pardonable), when the popular conception is that 50c each is the market price? Is his fee scale in a small town $25 per hour, and if not, why should his fees for x-ray examinations be larger than for other operations? When a dentist undertakes to calculate the cost of production he usually cheats himself, and gets a larger profit on paper than he can get in the bank. The suggestion that this

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Society investigate the economics of radiodontic practice was for the benefit of those who are less successful than Dr. Henderson. He does not need *this* "treatment."

Dr. McAlpin disposes of the knowledge required for radiographic examinations, by stating that the operation of the machine and finishing the radiograms is very simple and can be learned in a short time. Whether intentionally or not, by this statement he contributes to the impression that oral radiography is quite easy, an impression which has been the greatest factor in the neglect of this branch of practice. I cannot say how long a time is required to master radiodontia, because I still have so much to learn, but men who are giving it serious study are unanimous in believing it a difficult science worthy of intelligent application.

Dr. McAlpin's example of incorrect technic is confusing. He states that an exposure with an excessive penetration immediately after curettage "burned out" the detail, and appeared in the radiogram as though repair had occurred. This is the reverse of facts, for excessive penetration would exaggerate bone destruction and minimize repair. However, there is no occasion for caution in overpenetration with a $575 apparatus which he mentions.

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PLACING AND HOLDING FILMS IN THE MOUTH

(PART I: GENERAL CONSIDERATIONS. PART II: TECHNIC BY REGIONS.)

BY HOWARD R. RAPER, D.D.S., INDIANAPOLIS AND ALBUQUERQUE

(*Continued from the July issue.*)

PART II. TECHNIC BY REGIONS

Maxillary Incisor Region

Fig. 28.—Maxillary incisor region. The film packet is bent for this region in much the same manner as for the mandibular incisor region; not so much of the film need be bent back and it need not be bent back so sharply as is usually necessary for the mandibular region.

Fig. 29.—Maxillary incisor region. Lingual view of the film packet being held in place. (Holder No. 1 or No. 2 used for this region.)

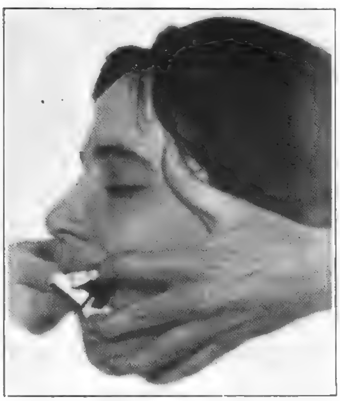

Fig. 30.

Fig. 31.

Figs. 30 and 31.—Maxillary incisor region. When the film packet and filmholder are first put in place in the maxillary incisor region, the filmholder may stand so far forward that the mandibular teeth do not strike the bottom bite plane of the holder. This is illustrated in Fig. 30. To overcome this, do two things: Bend the lower part of the holder upward and backward (this is made possible by the flexibility of the rubber back support) and instruct the patient to "reach forward with the lower teeth and bite." The result will be that the mandibular teeth will then bite against the bottom of the holder and hold it (and the film packet) as illustrated in Fig. 31.

(Note that the forefinger of the right hand is held against the back of the film packet in the region of the rubber back support in Fig. 30. Also see Fig. 23.)

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Maxillary Canine Region

Fig. 32.—Maxillary canine region. Bending the film packet for the maxillary right canine region. Quite a good deal of the upper front corner is bent back rather sharply.

Fig. 33.—Maxillary canine region. Lingual view of the film packet held in position. The maxillary canine region is a rather difficult region. (Holder No. 1 or No. 2 used in this region.)

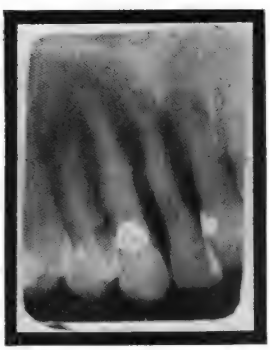

Fig. 34-A.

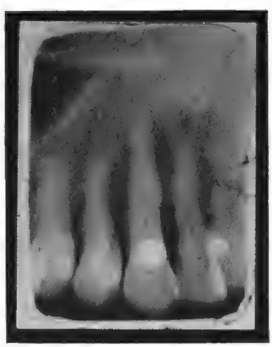

Fig. 34-B.

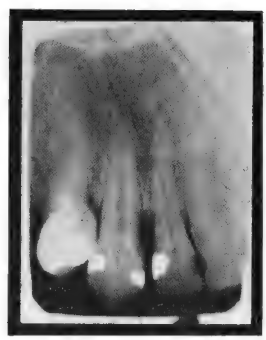

Fig. 35.

Figs. 34-A and 34-B.—Maxillary canine region. These two radiographs have the appearance of having been made with the films put in the mouth in different positions. The position of the films in the mouth was the same, however, for both. The reason the teeth fall diagonally on the film in Fig. 34-A is that the mesio-distal angle was too much like arrow No. 5A of Fig. 15. The mesio-distal angle for Fig. 34-B was more like arrow No. 5 of Fig. 15.

The shadows of the teeth almost never fall diagonally on the film when film holders are used except in the maxillary canine region, and, as just explained, it is due in this region to the mesio-distal angle, not to the manner in which the film is held in the mouth.

The shadows of the teeth often fall diagonally on the film when the film packets are held with the thumb or fingers unless the operator is very careful to line up the occlusal edge of his film packet parallel to the occlusal plane of the teeth.

Fig. 35.—Maxillary canine region. When the upper front corner of the film is bent too much, or when the mesio-distal angle is too much like arrow 5B of Fig. 15, the corner of the negative may finish entirely radiopaque as illustrated here. (This does not occur if the films are not backed with metal.)

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Maxillary Premolar Region

Fig. 36.—Maxillary premolar (and molar) region. Considerable of the upper front corner is bent back rather abruptly and the upper back corner is bent slightly. The packet illustrated here is bent for the right side.

Fig. 37.—Maxillary premolar (and molar) region. Lingual view of the film packet held in place. (See also Figs. 8, 9, 11, and 12 of this region of the mouth.) (Holder No. 1 or No. 2 used for this region. The writer prefers holder No. 1.)

Maxillary Molar Region

Fig. 38.—Maxillary molar region. Not much bending of the film packet is necessary for this region. Both front and back upper corners are bent slightly, also the lower back corner. The packet illustrated here is bent for the right side.

Fig. 39.—Maxillary molar region. Lingual view of the film packet held in place. The film packet can be held in this region with much greater ease and accuracy and less danger of gagging with the filmholder than with the patient's thumb or fingers. (Holder No. 1 for this region.)

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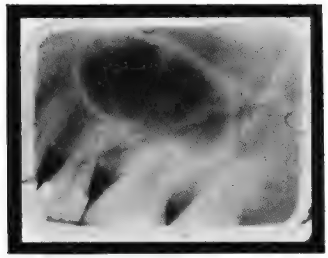
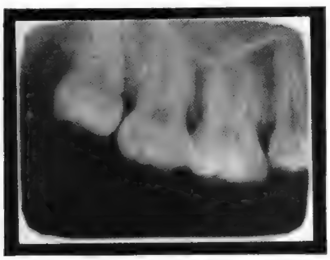
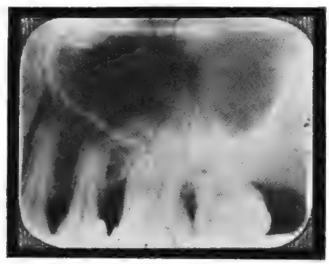
A.



B.



C.



D.

Figs. 40-A, 40-B, 40-C, and 40-D.—Maxillary molar regions. The films for these radiographs were not held in the mouth correctly. They were held by the patient with the thumb. In Figs. 40-A and 40-B the lower edge of the film packet was not lined up parallel with the crowns. This does not occur when a filmholder is used if the operator makes it a point to see that the holder does not tip when the patient bites on it. If tipping occurs, adjust the holder farther anteriorly on the edge of the film packet. Where teeth are missing, the holder may tip into the space if the operator does not see to it that the holder is adjusted to the film packet in such location that this tipping does not occur. If the space from which the teeth are missing is wide enough holder No. 3 may be used.

In Fig. 40-C the film packet was not held far enough rootwise. This cannot occur when the filmholder is used.

In Fig. 40-D the film packet was held too far rootwise and so the radiograph does not show all of the crowns of the teeth. (It is desirable to see the crowns of the teeth, to see whether there is incipient proximal decay.) This sort of thing cannot occur when filmholders are used.

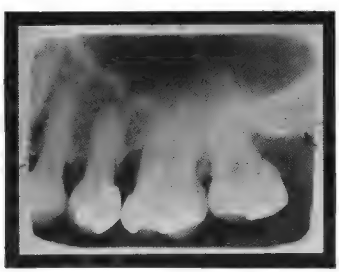


Fig. 41.—Same case as illustrated in Fig. 40-D. Fig. 41 was held correctly with a holder.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

RADIODONTIC RIDDLES

Illusion and Perspective

Q. Do the instruments advertised for viewing two films from the same exposure take the place of stereoscopic technic? If not, what is necessary to get the desired results?

A. Although magnifying lenses give a more distinct view of negatives than the unaided eye, the advantages of stereoscopic radiography cannot be obtained without two exposures made under the principles of binocular vision. Any viewing apparatus which eliminates extraneous light and distracting objects improves vision, while moderate magnification discloses additional detail and accentuates perspective. An ordinary reading glass noticeably separates the planes of distance and adds perspective to a photograph, and when applied to radiographic negatives serves the purpose without the complications of special viewing devices. Duplicate films viewed through a stereoscope give no more depth than the plastic or relief aspect secured by placing duplicate films in register and moving one slightly toward the lower right. In drawing and letter shading, this method is used to suggest the third dimension.

Stereoscopic photography and radiography is based upon an entirely different principle and serves a more useful purpose. Binocular vision is the fusion of the images seen with each eye by which form and distance are judged. The left eye sees slightly more of the left side of objects than the right eye, while the right eye sees more of the right side. The correlation of these impressions in the brain supplies the conception of the third dimension. The average distance of pupillary separation is 65 mm. or $2\frac{9}{16}$ inches, the extremes ranging from 60 to 70 mm. Hence, in accurately made stereoscopic cameras the lenses are placed 65 mm. from center to center, and in correct stereoradiography the tube target is shifted $2\frac{9}{16}$ inches between the two exposures. This produces two negatives, in which the relative position of objects in different planes is changed. To accurately record perspective, carefull technic is essential in exposures and mounting for view.

In stereoscopic intraoral radiography, immobility of the patient's head and the tube stand must be maintained from the beginning of the first ex-

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posure until the end of the second. Contrary to the general belief, the films need not be placed in exactly the same location for the two exposures if they are in the same plane, a fact which Dr. C. Edmund Kells has demonstrated. Although an attempt should be made to place the films in the same location, considerable discrepancy can be compensated for in mounting. This adaptability may be carried to the extreme of often being able to improvise a stereoscopic view from two exposures made without thought of stereoscopic technic. These will rarely fuse perfectly in the stereoscope and are not reliable for evidence.

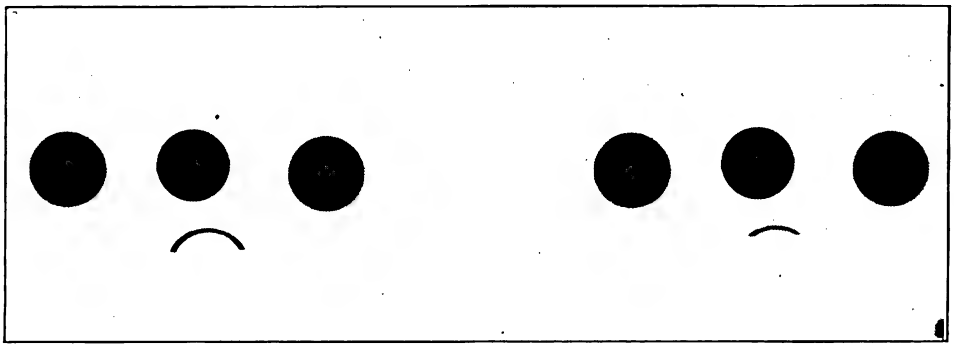

Fig. 1.—Duplicate films from the same exposure. You can view these spheres through a stereoscope until you see spots before the eyes as described in the nostrum almanacs, without being able to determine the relative size and location of the spheres. You would probably guess that the center sphere is farthest from the film.

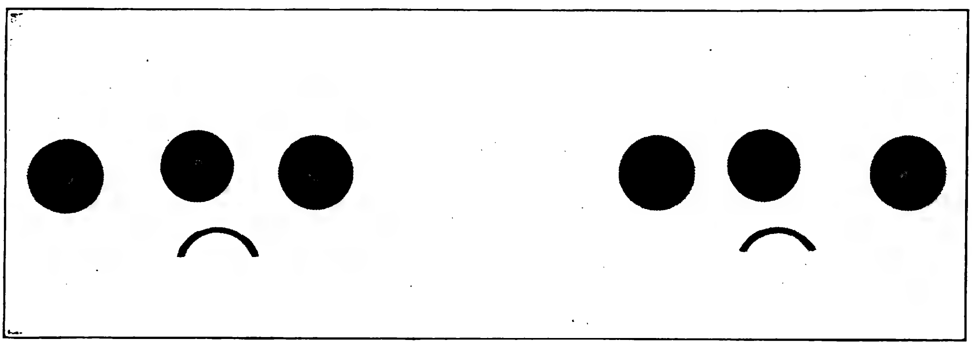

Fig. 2.—Three spheres of equal size arranged in an equilateral triangle, 1¼ inches from center to center. Radiographed at 18 inches with the target shifted approximately the correct distance. The result gives normal perspective with the relative size and location appearing in close conformity to existing conditions.

The stereoscopic shift when incorporated in tube stands is applicable only to a specific target-film distance if a small cone is used, because after the tube is shifted laterally the target is carried farther in each direction as the cone is centered. Such construction fulfills the requirements only when operating without a cone or an extremely large cone. Since the target should be moved no more or less than 2$\frac{9}{16}$ inches, the lateral movement of the tube carriage must be restricted to a distance which produces the correct target shift after centering the cone. This distance varies in relation to the target-

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film distance used, the lateral shift being shorter as the target-film distance is reduced. With a target-shift of more than the $2\frac{9}{16}$ inches the perspective is exaggerated and misleading in the relative size and location of objects. In conformity to this principle, the films should be viewed at the target-film distance. However, the eye is trained to judge the size of objects at different distances, so when there is an object of known size in the radiogram for comparison the viewing distance may be modified.

Unless the patient gives exceptional cooperation, it is advisable to bandage the head to the head rest. The chair and tube stand should be firmly

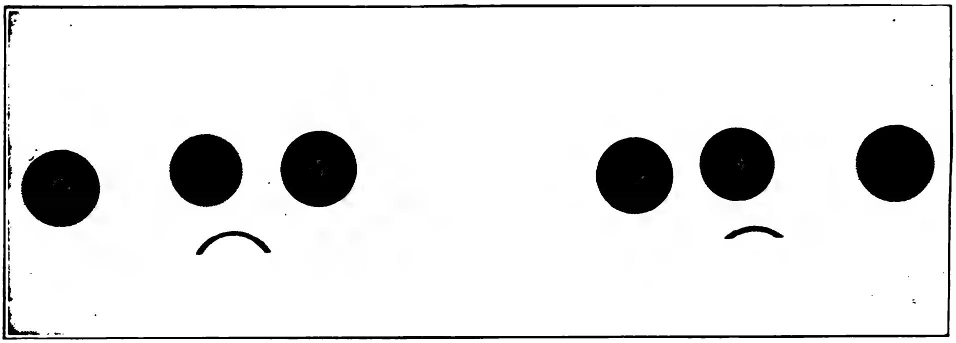

Fig. 3.—Exaggerated perspective from shifting the target too great a distance. Spheres in the same arrangement as Fig. 2. Radiographed at 12 inches with the target shifted $3\frac{3}{4}$ inches in centering the cone. The center sphere at the apex of the triangle appears about twice as far from the base as it is placed.

Fig. 4.—An accurately produced stereoscopic photograph giving the normal perspective in the slightest graduations of the distance planes. When stereoradiography is perfected to this state, the "pulpodontist" will be able to follow a canal like a corkscrew. Even stereoscopic photography is not just a matter of pushing the button. For example, if the camera is not laterally level, if the plate is not parallel with the plateholder, or accurately placed in the transposing frame, the result is worthless.

locked in position, and all preparations made to expedite the operation. With the tube carriage midway between the points established for the lateral shift the cone is centered upon the area to be examined. Before selecting the mesio-distal angle, the tube should be moved to the left and right position for trial. The curve of the arch often produces objectionable distortion when it is not equalized in the two oblique aspects, and unexpected wire complications may arise from the position of the tube stand. For methodical rou-

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tine, either the left or right view should always be made first, so whatever disposition is made of the first film packet there is no confusion with the subsequent one. The films should be permanently marked before development which is easily done by performing a corner of the left view with one pin-hole and the right with two. This not only identifies each aspect, but distinguishes the stereoscopic films from others of the same case. After some experience the left and right films can easily be distinguished, likewise the tube or film view when mounted.

The film exposed with the tube shifted to the left of the operator while facing the patient must be mounted on the left side when viewed from the nonemulsion or lingual side, and changed to the right side when viewed from the emulsion or external side. In common with other intraoral radiograms, stereoscopic negatives should be viewed from the nonemulsion side since the underfiring and secondary radiation produce an exaggerated aerial perspective in addition to the linear perspective. However, when the relative density of structures is not under consideration, a clearer conception of conditions may in some cases be obtained by viewing from each side. This especially applies to the study of cysts and the maxillary sinuses. The films may be viewed by holding them with rested fingers before a Holmes stereoscope, or better holding them in position on a $2\frac{1}{2} \times 7$ inch piece of glass while an assistant attaches them with binding strips. If the images fuse in some portions and not in others, it indicates that an error, most probably movement of the patient, has occurred in the procedure.

This may seem a long tiresome answer to a simple question, but you must know all this and more before successfully doing stereoradiography. Quite different from just buying a fancy ''scope'' and having every ''shot'' a beautiful spun-glass stereoscopic view through the magic lenses. So it is with most accomplishments, the best typewriter will not spell for you, a Stradivarius will not make you a musician, or the mahogany nickle-plated x-ray machine make you a radiodontist. Remember that the enticing ''slicker'' who writes the advertisements for dental equipment is better paid than the dentist who is the ultimate consumer of superfluous equipment. Unless you care more for display than utility, a hand (Holmes) stereoscope sold by optical dealers for a dollar or two will supply your needs. Stereoscopic intraoral radiography has rather limited advantages, so do not expect too much from it.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

Orthodontia — Oral Surgery — Surgical Orthodontia — Dental Radiography

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Studies of Diet in Relation to Health. E. V. McCollom (Baltimore). The Journal of the National Dental Association, April, 1922, ix, 4.

This paper was read by a biochemist to a body of dentists. He refers to the time only a few years back when a chemical analysis of foods was believed to exhaust the nutritive possibilities. Then about 1914 came the doctrine of vitamines, and it was learned that mere laboratory analysis told us nothing; instead came feeding experiments on young animals. The protein, mineral ingredients, etc., still retain their importance up to a certain point. The new ingredients comprise three or four substances known as vitamines. If the fat-soluble one is left out of the diet completely, the eye is the organ which is most noticeably affected. If another is left out we see develop a group of diseases known in the tropics a beri-beri. This name, however, is misleading and instead we should use the general designation chronic polyneuritis. This is seen in Labrador, a cold country, and also has been seen in prisoners confined in Elizabeth, N. J. A third type of deficiency-disease is scurvy, including the infantile form.

A diet composed of the most wholesome and nutritious foods from the old viewpoint—whole grain breads and flours, fresh vegetables, the finest cuts of meat—may actually bring about death if vitamines are absent. Conversely a carnivorous diet with its complete want of balance will enable certain animals and birds of prey to subsist indefinitely on it if all three vitamines are present. This is equally true of a pasturage diet in the case of the herbivora—animals thrive the year around on alfalfa alone. A third diet is termed by the author the Oriental, which deserves close study to comprehend. Superficially the natives appear to live on whole grains, principally wheat and millet, with a certain amount of pork, poultry and eggs. Close scrutiny has shown that the natives of these lands, Northern China, Japan, really are leaf-eaters so called, who consume vast amounts of green vegetables, the other dietetic elements playing a secondary rôle. This Oriental diet of temperate regions is not to be confused with the regimen of Southern Asia. A fourth diet is the nomadic in which the natives live on sour milk and meat, so that it is in reality carnivorous, although some vegetables are eaten. It is

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far superior to the Oriental diet in its effect on the general health. Once our ancestors were rice eaters because this was the only cereal which could compete with the grasses. With better facilities for cultivating the soil the other grains followed and many new kinds have continued to come into use. The process of high milling has been associated for one or another reason with physical deterioration. The teeth get less exercise and vitamines are sometimes eliminated from the diet. Both the teeth and bones suffer from deprivation of certain mineral matter. To comprehend this one should study the ancient and modern Icelander or American Indian. These peoples have come to subsist on package goods from the grocery instead of the products of the chase and hard foods. The changes may be summed up by the word rickets. The latter is not due to ordinary vitamine deficiency, or at least only to a limited extent, but is the result of change in diet, urban life, industrial life. Analogous conditions have been created for young animals in numerous experiments by many scientists including the author. To correct them it should only be necessary to return to the ancestral diet. Sugar should be cut out and greens and fodder types of foods substituted. What is aimed at is a return to a normal calcium and phosphorus ratio, for such is essential for proper growth of bone and teeth. Too little lime or too much phosphorus means rickets. There is also a vitamine involved but not the fat-soluble one. The efficacy of cod-liver oil and certain leaves of plants in rickets shows that some substance indispensable for fixing the mineral matter is present.

The Prophylactic Value of Using Nitrous-Oxide Oxygen in the Removal of Diseased Teeth to Avoid Systemic Reactions. B. H. Harms (Omaha). The Dental Cosmos, April, 1922, lxiv, 4.

The author's conclusions appended to his above articles are as follows: For the well-being of the patient anesthetics are not properly considered as to their physiological and pathological action. In the removal of diseased teeth it is desirable that none of the activity of the body defenses be limited or destroyed by the use of any drugs or anesthetics. The leucocytes are the body's first line of defense against invading microörganisms. Any agent which limits the action of the leucocytes, either by destroying them or preventing their passage to the invaded part by initial ischemia and secondary edema, tends to lower the resistance of that tissue and the individual to the invading microörganisms. Any tissue which has had its normal circulation and oxygen tension interfered with has lost its normal degree of immunity. Local anesthetics initially interfere with the circulation and oxygen tension of the parts that they anesthetize, and, secondarily, cause edema, thereby increasing the susceptibility of the part to infection and autoinoculation. General anesthetics, other than nitrous-oxid gas and oxygen, lower the resistance of the patient's mouth to infection. Fatal cases from the removal of teeth have not been properly reported.

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Method of Determining the Prognosis of Oral Infections. H. J. Kauffer (New York). The Dental Cosmos, May, 1922, lxiv, 5.

In the past five years the author has recorded 200 cases of oral infection, analysis of which furnishes data of prognostic significance. This material was entirely selected, for all of the patients had originally sought the skin clinic and all were found later to have alveolar abscesses. The latter represented only mere coincidence for it is not suggested that the cutaneous lesions were results of oral infection. The author wishes only to show that these abscessed teeth were of the silent type—that the patients as a rule had no knowledge of their existence, and that this ignorance has its advantages in the analysis of a large material. Aside from the skin lesions the subject was mostly in excellent condition.

Of the 200 cases 162 had apical, and 130 lateral infection (pyorrhea). Thirty-eight had lateral abscess only against 70 with only apical abscess. Every one of the 200 patients was treated with autogenous vaccine, the organisms being taken directly from the oral abscess. In 28 of the number there was a marked reaction from a small dose and in each case there was evidence of focal infection—muscular rheumatism, neuritis, arthritis, etc. With a few exceptions all of these cases recovered completely after extraction and vaccinotherapy. Of the other 172 cases 48 received root-canal therapy by various methods. In the entire series of 172 even large doses of autovaccines had failed to produce a reaction. Thirty cases of pyorrhea were cured by routine treatment. This leaves 94 patients who were permitted to retain the teeth save the one used to prepare the pus for vaccination. Pyorrhea, when present, was treated, but periapical abscess was let severely alone and up to date there have been no focal lesions or symptoms.

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EDITORIALS

Mayo Asks Bigger Schools

A NEWS article in the Minneapolis Journal of June 12 containing the above heading, gives some of the views Dr. William J. Mayo holds in regard to medical education, as it is being conducted at the University of Minnesota.

We have known for a number of years that certain university medical schools, as well as dental schools, have been working towards the goal of exclusive education in the professions and have been raising their preliminary requirements so high that only a few students were able to enter. In addition to that, some schools of medicine have been limiting their classes and are not accepting as many as can meet the preliminary requirements. This has been very unfortunate; as a result of it, a large number of students, who would otherwise study medicine have been forced into the osteopathic, chiropractic and neuropractic schools.

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The action of such medical schools has produced a condition to which we have called attention before. It is a great detriment to the medical profession as well as the public at large. For a number of years, the medical profession has been able to enact certain laws regulating the practice of medicine and controlling public health, but in the next few years to come, we will find that medical laws and health programs will be controlled not by graduates from medical schools, but by men from osteopathic, chiropractic and neuropractic schools, because they will gradually outnumber the medical men and will consequently be able to control all legislation.

In California, the chiropractors have organized, and are now of sufficient numbers to practically control the situation at the present time. This is one phase of the subject which is to be regretted, but is different from the one suggested by Dr. Mayo in his interview published in the Minneapolis Journal. Dr. Mayo says "The University should provide that any one who wants to enter a university may do so if he is capable of meeting their requirements. The university has no right to add subjects to its curriculum that are not useful today. We are giving the student an enormous amount of information that is of no use."

We believe Dr. Mayo refers to subjects given in the pre-medical course which consume time and which may be interesting as cultural branches but which do not increase the student's ability to practice medicine as a healing art.

Dr. Mayo, as well as President L. D. Coffman, calls attention to the fact that last year there were 224 applicants to the school of medicine, 200 of which met the requirements for admission and only 40 were admitted, while 160 were turned away. It would be quite an interesting thing to know where the 160 men went who were turned away. Probably you will find most of them in chiropractic, osteopathic and neuropractic schools and you may be assured that as a result of the treatment which they received from the medical school, they will hold no good will toward the medical profession after they graduate.

Certainly the 160 turned away will be a larger factor in the future of medicine than the 40 who were graduated. Let us hope that the authorities that are controlling medical education at the present time will realize that their greatest duty is to provide medical service for the public by an efficient educational plan, which will allow a sufficient number of men to enter medical college to take care of the medical needs of the public. There is no reason why 40 students should be educated and 160 turned away just because a certain medical program has been outlined by a few individuals which makes such a plan compulsory.

We believe that a similar plan is being advocated by a certain group in regard to dental education, and the information has come to us from various sources that in the future, certain dental schools will limit their classes to small numbers and try to force the requirements of the dental profession to meet the requirements of the schools who advocate small classes, but necessarily must possess large endowments.

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We only hope that the impracticability of this plan of dental and medical education will become apparent before too much harm has been done to the profession.

Genetics*

THE first edition "Genetics" by Herbert Eugene Walter, made its appearance nearly ten years ago. A quotation from the Preface of this second edition is a very accurate account of the progress which has been made in the last ten years. Quoting from the preface we find "The biological Rip Van Winkle of today who awaking after a decade of somnolence, gazes again upon the genetic village of Falling Waters, will indeed need to rub his astonished eyes at the changed scene that now spreads out before him. Many old familiar landmarks, such as 'unit characters' and 'dominance,' show signs of dilapidation, while strange children, shouting a medley of outlandish words, 'linkage,' 'tetraploidy,' and 'nondisjunction,' for example, are playing new games on the village green."

The statement of the author shows that our ideas in regard to hereditary characteristics have been radically changed during the last ten years due to research work by many investigators. He quotes extensively from the work of Castle, Morgan, Conklin and Babcock and Clausen, and we know of no volume that will give a better analysis of the subject today.

The question of heredity has always been of importance to the orthodontist, and so many men know so little about the subject that we find statements made by various writers exactly opposite to those of others. In fact, some men will interpret a certain portion of research work as meaning one thing while a more capable man will get an entirely different view.

The book begins with a chapter dealing with the "Idea of Species" and the "Relation of the Somatoplasm to the Germplasm." The subject of "Variation" is very carefully considered. The different views of the old writers are given attention.

The chapter on the "Inheritance of Acquired Characters" is extremely interesting to the orthodontist because it is around this field that so much orthodontic literature has been written. Likewise, blending inheritance is very important, because of the bearing it has on the old theory that a child will inherit the teeth of the one arch and the small jaws of the other.

One very interesting chapter is the determination of sex, which is a subject that has received much attention during the last few years. The last two chapters are devoted to the human race in which a study of the lower animals is considered in the application of the human.

The orthodontist is interested in Genetics and the result of heredity as a production of malocclusion. We know of no book from which he can gain a greater amount of knowledge.

*Genetics. By Herbert Eugene Walter, Associate Professor of Biology, Brown University. Revised edition 92 figures and diagrams. Published by the MacMillan Company.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Side Lights of the California Meeting of the National Dental Association

OTHER meetings in the past have had to contend with hot weather, sometimes with beastly hot weather—so hot in fact that one felt like sending for the traditional blankets, which ex-president Taft once said were a necessary appendage to one's equipment when changing place of residence from the Mojave desert of California to hades.

No so with Los Angeles. As usual the weather and climate were delightful, all that could be expected with a little thrown in for good measure.

It has been said that next to taxes and the high cost of living, California climate is about the most dependable institution we have in this country—yes and one of the most satisfactory. It is not beautiful in spots, it is beautiful all over.

But to get more specifically to orthodontia and the orthodontic section of the big meeting, first the California orthodontists (of which there seems to be plenty to amply serve the population) did themselves proud in making the stay of visiting orthodontists pleasant and agreeable. The spirit seemed to prevail everywhere, with very few exceptions in effect that whether you are a user and loyal advocate of Dr. Jones' barbed wire trench entanglement appliance or whether you are equally enthusiastic over the merits of Dr. Smith's or Doe's "work while you sleep" wonder-worker, that you were there for one grand purpose, namely to exchange and mutually discuss ideas for the advancement of orthodontia as a science and specialty.

The casual tourist learns to lend an attentive ear to the wonderful stories of development and growth of southern California and the almost astounding incidents which happen in this God-favored spot. In fact there was one story current in the orthodontic section at least in which it was said that while the favored city could not boast of a scenic wonder so outstanding as the belching volcano Mount Popocatepetl in Mexico, it could boast, however, of a fire department which can put the famous volcano *out* if their services should be required at any time.

There were stories current of equal interest and astonishment to visit-

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ing orthodontists, incidents having occurred of orthodontic cases having been treated in three or four visits to the orthodontist in some instances, the patients being from several hundred miles distant from the city.

Really the majority of things said about the wonderful spots of southern California are true and the citizens of this community are anxious to show you that they are true. The native dentists at the meeting would tell you a story, then ask you to get into their automobile and usually the story would be proved or it would turn out to be a joke upon you the unfortunate and unhappy visitor in the community.

To the tired orthodontist who has made the long jaunt to California in search of both youth and knowledge there are only two things which remain a mystery in his mind. First those little animals, which they tell you about which make their residence in the bottom of the Grand Canyon and when you are bitten by them will not release their hold until it thunders; and second, the superorthodontic device will remain one of California's newest and most interesting mysteries heard of in the miracle city.

The visiting dentists were invited to see Tom Mix, the famous film star, do some astounding feats of horsemanship in the Hollywood bowl.

The following is a résumé of the program of the section of orthodontia and periodontia.

Tuesday Afternoon, July 18

2:00 to 4:00.

ORTHODONTIA AND PERIODONTIA

(*Assembly Room "H," Ambassador Hotel*)

OFFICERS OF SECTION

Leland E. Carter, Chairman .... San Francisco, Cal.
Flood Bldg.
Clyde M. Gearhart, Vice-Chairman .... Washington, D. C.
1624 I St., N. W.
B. Frank Gray, Secretary .... San Francisco, Cal.
909 Hyde St.

"Some Things of Importance to Be Considered in the Practice of Periodontia and Orthodontia"
By Frank M. Casto ....Cleveland, Ohio
Discussed by
J. Herbert Hood ....Cleveland, Ohio
O. W. White ....Detroit, Mich.

"Inharmonious Cusp Relation as a Factor in Periclasia"
By A. W. Ward ....San Francisco, Cal.
Discussed by
Frederick S. McKay ....New York, N. Y.
J. H. Mackay ....Oakland, Cal.

"Surgical Treatment of Periodontal Lesions"
By Olin Kirkland ....Montgomery, Ala.
Discussed by
Frank C. Pague ....San Francisco, Cal.
D. Arthur Johnston ....Los Angeles, Cal.
Election of section officers for ensuing year.

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Wednesday Morning, July 19

9:00 to 12:00.

ORTHODONTIA AND PERIODONTIA

(*Assembly Room "H"*)

"The Importance of Simplicity in Orthodontic Mechanism"
By James D. McCoy ....Los Angeles, Cal.

Discussed by
Charles C. Mann ....Seattle, Wash.
J. Camp Dean ....Oakland, Cal.

"The Third Molar vs. Normal Occlusion"
By H. L. Morehouse ....Spokane, Wash.

Discussed by
J. A. Gorman..New Orleans, La.
Allen H. Suggett ....San Francisco, Cal.

"The Regulation of Children's Teeth"
By Calvin S. Case ....Chicago, Ill.

Discussed by
B. E. Lischer ....St. Louis, Mo.
M. N. Federspiel ....Milwaukee, Wis.

Thursday Morning, July 20

9:00 to 12:00.

ORTHODONTIA AND PERIODONTIA

(*Assembly Room "H"*)

"The Orthodontist's Problems in Connection with Pulpless, Missing and Impacted Teeth"
By Albert H. Ketcham ....Denver, Colo.

Discussed by
Robert Dunn ....San Francisco, Cal.
Frank A. Gough ....New York, N. Y.

"Arch Predetermination—Is It Practical?"
By William H. Gilpatric ....Boston, Mass.

Discussed by
John R. McCoy ....Los Angeles, Cal.
Carl O. Engstrom ....Sacramento, Cal.

Clinics

ORTHODONTIA

COLORADO

29

"An Orthodontic Method of Supplying a Missing Tooth"
By A. H. Ketcham ....Denver

MASSACHUSETTS

30

"Demonstrating Arch Predetermination" (Table Clinic)
By William H. Gilpatric ....Boston

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MISSOURI

31

"Demonstrating the Various Points of Merit of an Original Orthodontic Appliance" (Table Clinic) (1) Very active through an extended period. (2) Inconspicuous and nonirritating. (3) Favorable to prophylaxis. (4) Easily constructed. (5) Easily controlled. (6) Easily converted into retaining appliance. (7) Constructed of noble metals at a cost ranging from one-third to one-half less than manufactured appliances.

By Hugh G. Tanzey .... Kansas City
Homer Anson Potter, Jr. .... Kansas City

MONTANA

32

"Orthodontia Showing an Original Method of Attachment"

By H. K. Vonder Heydt .... Butte

NEW YORK

33

"Orthodontia"

By A. Hoffman .... Buffalo

OREGON

34

"Orthodontia—Consideration of Principles Involved in the Treatment of Cases Requiring Pronounced Development"

By E. M. Griffith .... Portland

Pacific Coast Society of Orthodontists

The Ninth Annual Meeting Pacific Coast Society of Orthodontists was held at the Angelus Hotel, Los Angeles, California, Thursday, Friday and Saturday, July 13, 14 and 15, 1922.

The following program was enjoyed:

Thursday, July 13

10:00 A. M.
President's Address.
Dr. Charles C. Mann, Seattle, Wash.
Discussion opened by Dr. James D. McCoy, Los Angeles, Cal.
Business meetings of the Society will be announced by the President.

2:00 P. M.
"Art in Dentistry"
Dr. Allen H. Suggett, San Francisco, Cal.
Discussion opened by Dr. B. Frank Gray, San Francisco, Cal.

3:00 P. M.
"Malocclusion—A Million Cases! How Prevented"
Dr. B. Frank Gray, San Francisco, Cal.
Discussion opened by Dr. John R. McCoy, Los Angeles, Cal.

Friday, July 14

9:30 A. M.
"Usefulness of the X-ray Machine in Orthodontia"
Dr. Charles S. McCowen, Palo Alto, Cal.
Discussion opened by Dr. Leland E. Carter, San Francisco, Cal.

10:30 A. M.
"The Influence of the Endocrine Glands Upon Dentition." (Lantern slide demonstration of Endocrinopathies.)
Dr. Nelson W. Janney, Los Angeles, Cal.
Discussion opened by Dr. James D. McCoy, Los Angeles, Calif.

2:00 P. M.
"Some Anomalies of Dentition of Interest to the Orthodontist." (Illustrated Lecture.)
Dr. J. Lowe Young, New York.
Discussion opened by Dr. H. L. Morehouse, Spokane, Wash.

3:00 P. M.
"Principles of Dento-facial Diagnosis of Malocclusion." (With lantern slides.)
Dr. Calvin S. Case, Chicago, Ill.
Discussion opened by Dr. Robert Dunn, San Francisco, Cal.

Saturday, July 15

9:30 A. M.
"The Lingual Wire in Early Orthodontic Treatment"
Dr. E. C. Read, Long Beach, Cal.

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Discussion opened by Dr. Allen E. Scott, San Francisco, Cal.

10:30 A. M.
"Advantages of Lingual Appliances, When Indicated, and the Ideal Age for Their Application in Distoclusion Cases"
Dr. P. T. Meaney, Portland, Ore.
Discussion opened by Dr. H. F. Sturdevant, Portland, Ore.

11:30 A. M.
"An Advantageous Method of Applying Lingual Orthodontic Appliances"
Dr. W. J. Bell, Los Angeles, Calif.
Discussion opened by Dr. A. A. Solley, San Francisco, Cal.

CLINICS

2:00 P. M.
"Arch Predetermination"
Dr. W. H. Gilpatric, Boston, Mass.
"Meeting the Problems Occasioned by Missing and Pulpless Teeth"
Dr. A. H. Ketcham, Denver, Colo.
"Construction of Appliances for Bodily Movement of Teeth"
Dr. Calvin S. Case, Chicago, Ill.
"Attachments to the Labial Arch Wire"
Dr. Arthur W. Sobey, San Francisco, Cal.
"The Lingual Inclined Plane"
Dr. Howard Dunn, San Francisco, Cal.
"The Removable Lingual Arch in Combination with a Labial Arch Wire for the Treatment of Certain Types of Malocclusion"
Dr. James D. McCoy, Los Angeles, Cal.
"Instruments for Unlocking, Removing and Replacing the Lingual Arch Wire"
Dr. John R. McCoy, Los Angeles, Cal.
"Bite Impressions"
Dr. Carl O. Engstrom, Sacramento, Cal.
"Black Club Exhibit"
Dr. Thomas R. Sweet, Oakland, Cal.
"The Use of Special Instruments for Determining the Accuracy of Adjustments to the Lingual Arch"
Dr. Robert Dunn, San Francisco, Cal.

Notes of Interest

After August first Dr. L. J. Porter will be located at 665 Fifth Avenue. New York City.

Dr. P. T. Meaney, orthodontist, announces the removal of his offices from the Stevens Building to 902 Selling Building, Portland, Oregon

Dr. John Milton Jones announces his removal to seventh floor Orpheum Building, Wichita, Kansas. Orthodontia exclusively.

Dr. George E. Halley announces the removal of his offices to 607 Bryant Building, Kansas City, Mo., where he will continue to practice orthodontia exclusively.

Dr. Frederick K. Ream and Dr. John W. Berryman announce their removal from Aeolian Hall, 33 West 42nd Street, to 452 Fifth Avenue, at 40th Street, New York City. Oral surgery and dental radiography.

Wilson Robert Conran, D.D.S., two years dental interne Hartford Hospital, announces the opening of his office at Number Eighteen Asylum Street, Hartford-Aetna National Bank Building, Hartford, Conn. Practice limited to oral surgery and radiography.

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The International Journal of
Orthodontia, Oral Surgery and Radiography
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Vol. VIII St. Louis, September, 1922 No. 9

ORIGINAL ARTICLES

THE EFFECT OF THE WAR DIET ON THE TEETH AND JAWS OF THE CHILDREN OF VIENNA, AUSTRIA*

By Sheldon Friel, B.A., M.Dent.Sc. (Dublin)

The etiology of dental caries and malocclusion of the teeth is still obscure, and consequently occupies the most important position in the researches that can be undertaken by members of our profession, as only by a truer knowledge of the etiology can we ever hope to prevent the ravages of dental disease. Prevention should be the aim and object which we have always in view.

It is a lamentable fact that many people enter the dental profession because they consider that it consists only of mechanical processes. The removal of decayed portions of teeth, and their mechanical restoration; the movement of irregular teeth into regular positions by mechanical appliances form so much of the education of the dental student that the infinitely more important work of etiology occupies a very secondary position.

I think that the dental profession is getting out of this rut, and we appreciate the efforts of such men as A. LeRoy Johnson, Hellman, and a few others in placing our own specialty on a more scientific basis.

A considerable amount of attention has recently been drawn to the possibility that the accessory food factors or vitamines may play an important rôle in the causation of caries and maldevelopment of dental tissues. Mrs. May Mellanby of the King's College for Women in London has carried out a series of experiments in the feeding of puppies with food wanting in vitamines and was able to show that the calcification of the teeth was poor, the date of the eruption of the deciduous teeth delayed, the loss of the deciduous, and the eruption of the permanent teeth also delayed, and finally that

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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the development of the jaws was such as produced crowding of the teeth especially in the lower incisal region.[1]

Mrs. Mellanby considered that similar conditions might prevail in the mouths of the children in Austria and Poland who have suffered so terribly during and after the war.

The absence of the fat-soluble A vitamine was said to be the cause of the maldevelopment of the teeth and jaws in puppies experimented upon by

Name

No. 590.

Age 5 yrs. 9 months

Date Oct 25 1920

Weight 14 2 kg Height Sitting 53 cm

Handgrip

Including plaster leg splints

Diet :—

1. First year—Natural, Artificial or Mixed
   If Artificial Nature of Food

2. First to Sixth year

3. Present diet—Breakfast

Lunch

Dinner

Tea

Sweets and Fruit

Character of Mastication (normal, vigorous or feeble)

Maximum pressure between molars, Right — Left

Breathing Normal — Adenoids, etc.

Nose

Lips — Max. pressure

Tongue

Habits—(*a.*) Comforters, etc. — Length of time used

(*b.*) Sucking or biting fingers, etc.

General Health, Illness Rickets. 1st tooth erupted 2 years old

Cannot stand or walk

Fig. 1.

Mrs. Mellanby and this vitamine was probably deficient in the diet of Vienna children. It is considered also to have an intimate relation in the causation of rickets.

The fat-soluble A vitamine is especially abundant in milk, butter, eggs, and animal fats, except lard. These foods were almost entirely absent from the diet of the working class children in Vienna. This vitamine is also present in green leaves such as cabbage, lettuce, and spinach which were more plentiful.

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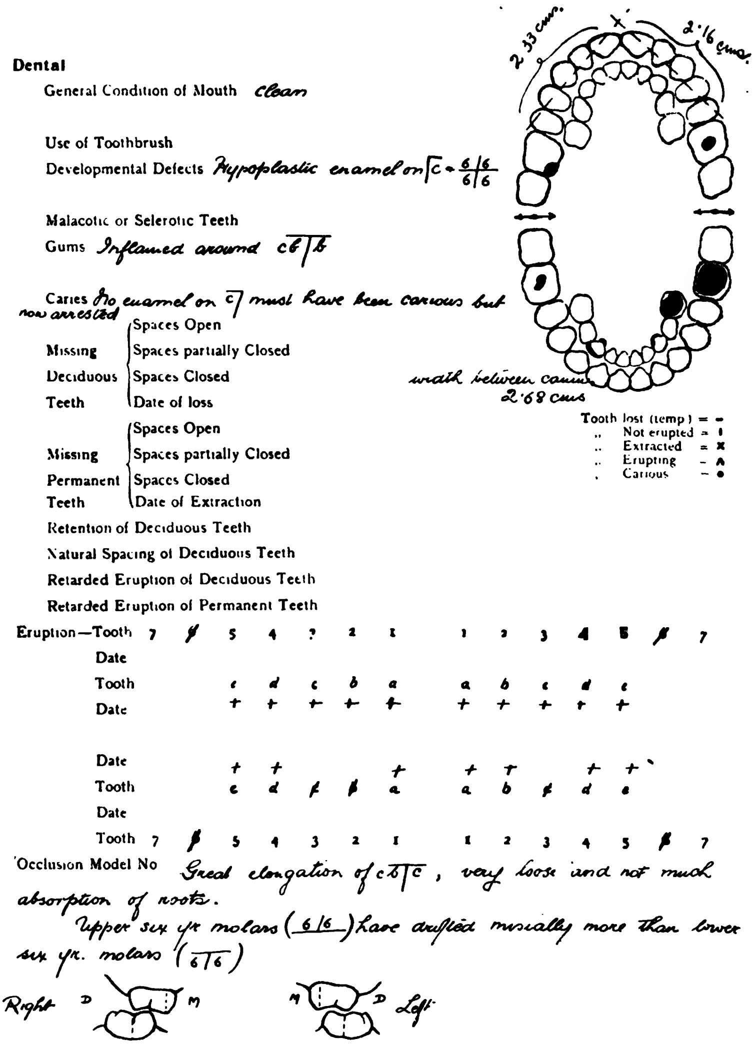
It seemed likely that an examination of the Vienna children would give information which might be far-reaching in the etiology of dental diseases.

Somewhat similar work on feeding of animals has been carried out by Howe of Boston; his results suggest that the advent of caries and pyorrhea may also be influenced by a diet deficient in vitamines.[2]



Dental

General Condition of Mouth *Clean*

Use of Toothbrush

Developmental Defects *Hypoplastic enamel on |c + 6|6 / 6|6*

Malacotic or Selerotic Teeth

Gums *Inflamed around c6|b*

Caries *No enamel on c| must have been carious but now arrested*

Missing Deciduous Teeth: Spaces Open; Spaces partially Closed; Spaces Closed; Date of loss

Missing Permanent Teeth: Spaces Open; Spaces partially Closed; Spaces Closed; Date of Extraction

Retention of Deciduous Teeth

Natural Spacing of Deciduous Teeth

Retarded Eruption of Deciduous Teeth

Retarded Eruption of Permanent Teeth

Eruption—Tooth	7	6̸	5	4	3	2	1	1	2	3	4	5	6̸	7
Date														
Tooth			e	d	c	b	a	a	b	c	d	e		
Date			+	+	+	+	+	+	+	+	+	+		
Date			+	+			+	+	+		+	+		
Tooth			e	d	c̸	b̸	a	a	b	c̸	d	e		
Date														
Tooth	7	6̸	5	4	3	2	1	1	2	3	4	5	6̸	7

Occlusion Model No *Great elongation of cb|c, very loose and not much absorption of roots.*

Upper six yr molars (6|6) have drifted mesially more than lower six yr. molars (6|6)

Fig. 2.

In Mrs. Mellanby's experiments of

35 puppies fed on very deficient Fat Sol. "A" diet.	29 showed very irregular teeth. 3 slightly irregular. 3 regular.
5 puppies fed on a somewhat deficient diet	4 had slightly irregular teeth. 1 regular.
19 puppies fed on efficient diet.	4 were slightly irregular. 15 were regular.

i. e., 89 % irregular on deficient diet.
20 % slightly irregular on efficient diet.

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I shall now endeavor to show you the results of this investigation and to draw conclusions that may be of importance in the unravelling of the etiology of dental diseases.

In order that the investigation should be of any practical value it was essential that a great many details should be observed, and the examination should be conducted on similar lines to the investigations that have been carried out by other dentists in other countries. The chief points which I decided to investigate were the weight, height, handgrip, form of breathing, general health, condition of gums, developmental defects of teeth, stains, caries, time of eruption of teeth, maldevelopment of jaws, and malocclusion of teeth of children from six months to fourteen years of age.

For this purpose I had charts printed with these headings, and smaller charts for marking hypoplasia of the enamel. (Figs. 1, 2, and 3.) The children to be examined were divided into three groups:

1. Children attending child welfare centres aged six months to six years.
2. Children attending schools aged six years to fourteen years. Both

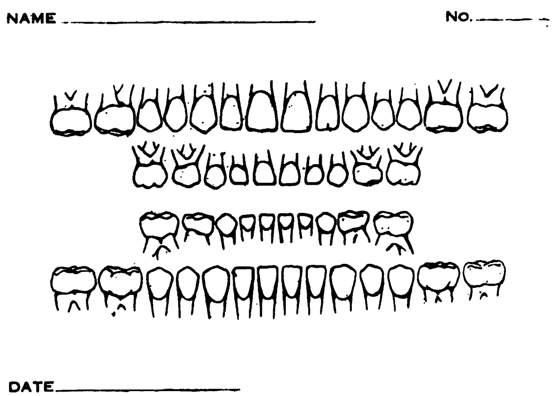

Fig. 3.

these groups are the so-called healthy children of the working classes in Vienna.

3. Children under treatment at one of the hospitals for the effects of under-nourishment, chiefly rickets, aged one year to eight years.

In all about 520 children were examined.

It was impossible to obtain any reliable statistics from the children themselves as to their food during the past six years and one could only find out these statistics in a general way from educated people who had a knowledge of the conditions among all classes in Vienna.

One gathers that previous to the war, meat, butter and whole milk were not very plentiful among the working classes. Coffee, beer, cereals, potatoes and kraut were the staple foods. Fruit in season was very plentiful and was greatly consumed.

Rickets was apparently a very common disease before the war, and a great number of pre-war children showed many manifestations of the disease in the shape of their heads and chests as well as marked hypoplasia of the

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teeth of a type that has been associated with rickets. Very few of these cases had had rickets so badly as the majority of the children examined in the hospital.

During the war the fixed rations were

Bread	2 lbs. 12 oz.	per week.
Flour	8¾ oz.	" "

Meat (rationed in 1917) 3½ oz. per week.
Fat, which included butter (very rarely), oil, margarine or lard 4½ oz. per week.

Sugar	1 lb. 10¼ oz.	per month.
Coffee	8¾ oz.	" "

Jam 8¾ oz. to 1 lb. 1½ oz. per six weeks.
Potatoes varied tremendously, often none.
Legumes not rationed until last year and seldom to be had.
Cabbage and turnips not rationed.
Milk—none for adults except the sick.

children 6-14 years	.22 pint		
2- 6 years	.88 "	later reduced to .44 pint.	
1- 2 years	.88 "		
under 1 year	1.76 "	per day.	

Owing to the scarcity and cost the working classes *very seldom* got these rations of meat, legumes, milk, or butter. They had bread of very poor quality; by this I mean that the bread was made from adulterated flour, and not bread that was made from flour in which was included the whole or part of the offal or outer layers of the seed. Their ration of flour was mostly used for boiled flour puddings. Kraut and turnips were the most plentiful food. War coffee was made out of the rinds of turnips, etc., dried and roasted.

Since the war the food is slightly better. It is more evenly distributed, though still a famine diet.

The official rations consist of:

Bread	2 lbs.	12 oz.	per week.
Flour	1 lb.	1½ oz.	
Fat	4 oz.	3.72 drms.	
Meat	3½ oz.		
Sugar	1 lb.	5 oz.	per month

Milk None except for children.
2-6 years 1 tin of condensed milk per fortnight.
1-2 years 3 tins of condensed milk per week.
Under 1 year 1¼ pints per day.

Coffee	not rationed but very expensive.
Jam	
Potatoes	
Kraut	
Turnips	
Beans	

Such a diet as this, which has been in vogue for the last five or six years is very much more deficient in fats than that existing in America or England during the same period and one would naturally expect that it would cause great changes in the development of the jaws and teeth and in the amount of caries.

That the deficient diet has had a very large influence in the production of rickets, tuberculosis, and anemia there is no doubt; but there appears to

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be no very marked increase of dental diseases or maldevelopment except in one direction.

It was desirable to take the weight and height of the children examined in order to show their general development. The weights and heights of the school children, and of the hospital children were taken, but it was impossible to get it done for the welfare centre children. The weight was very nearly absolute as the children had very little clothes on during the examination. The height taken was the sitting height. Prof. Von Pirquet, who is the head of the Children's Clinic and who is also the Austrian Director of the American Relief Mission, considers that a more reliable criterion can be obtained of a child's development by the relation of the sitting height to the weight, than by the method of comparing the total height to the weight.

When one compares the weights of the children examined with the sta-

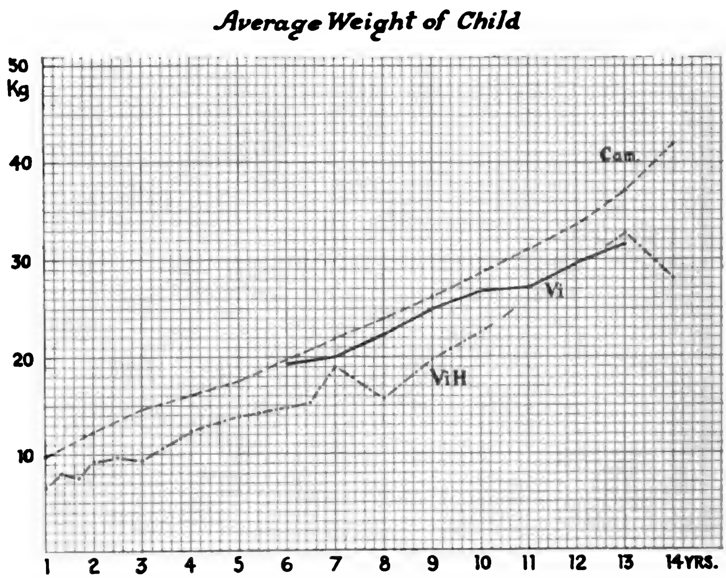

Fig. 4.—The Vienna Welfare Centre children aged 6 months to 6 years and the school children aged 6 years to 14 years are designated as Vi. The Meidling Hospital children aged 1 year to 8 years are designated as ViH. The Statistics of Bunting are designated as Mi. The Statistics of Cunningham are designated as Eng. The Statistics of Camerer are designated as Cam.

tistics of Camerer one sees a very marked difference. They are on an average about 14 pounds underweight and are correspondingly undersized[3] (Fig. 4).

The next series of graphs demonstrate the time of appearance of the deciduous and permanent teeth. In the diagram Fig. 5, I have compared the welfare centre children with the hospital children. The diagram shows the age when 100 per cent of each deciduous tooth was present, and you notice that the eruption of the teeth of the hospital children was very delayed in comparison with the teeth of the welfare centre children.

The next series of graphs, Figs. 6 to 12, demonstrate the percentage of eruption of each permanent tooth at each year. I have compared the school children and the hospital children with the statistics published in the Dental

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Cosmos of 1908 giving the result of an investigation carried out by Bunting at Ann Arbor, Michigan.[4] One notices that there is little difference between the times of the eruption of the teeth of the Vienna school children and the Michigan children. The retardation in the eruption of the teeth of the hospital children is more marked.

The next graphs are of the percentage of caries in the deciduous and permanent teeth, and also the premature loss of deciduous teeth.

TABLE I

SCHOOL CHILDREN (VIENNA)

AVERAGE WEIGHTS, HEIGHTS AND HAND-GRIPS

AGE	WEIGHT	HEIGHT	HAND-GRIP RIGHT	HAND-GRIP LEFT	NO. EXAMINED
6 years	19.4 kilograms	60.5 cms.	12 lbs. 1 oz	11 lbs. 3 oz.	37
7 years	20.02 "	63.2 "	14 " 4 "	13 " 1 "	20
8 years	22.4 "	65.2 "	15 " 15 "	14 " 14 "	24
9 years	25.01 "	68.5 "	21 " 6 "	18 " 13 "	35
10 years	26.8 "	70.3 "	22 " 2 "	19 " 6 "	33
11 years	27.2 "	71.5 "	24 " 3 "	21 " 3 "	32
12 years	29.6 "	73.02 "	26 " 9 "	24 " 11 "	35
13 years	31.5 "	73.05 "	28 " 2 "	26 " 12 "	19

TABLE II

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (VIENNA HOSPITAL)
AVERAGE WEIGHTS AND HEIGHTS

AGE	WEIGHT	HEIGHT	NO. EXAMINED
12-16 months	6.77 kilograms	43.42 cms.	7
16-20 months	8.02 "	45.6 "	10
20-24 months	7.83 "	45.87 "	8
2 -2½ years	9.37 "	46.5 "	8
2½-3 years	9.65 "	49.4 "	5
3 -3½ years	9.4 "	46.5 "	4
3½-4 years	10.82 "	49.12 "	8
4 -4½ years	12.43 "	52.5 "	9
4½-5 years	13.15 "	53.33 "	16
5 -5½ years	13.91 "	53.66 "	12
5½-6 years		58.2 "	10
6 -6½ years	14.95 "	54.31 "	8
6½-7 years	15.2 "	54.2 "	5
7 -8 years	19.01 "	59.85 "	8
8 -9 years	15.72 "	57.12 "	4
9 -10 years	19.85 "	64.5 "	2
10 -11 years	22.5 "	65 "	1
13 -14 years	32.8 "	76.33 "	3

In determining the percentage of caries I adopted two methods. In the first place I took the percentage of the total deciduous or permanent teeth present Fig. 15, and in the second place I took the percentage of caries of deciduous teeth of the total deciduous teeth present plus those that were prematurely lost (Fig. 13). The percentage of those that were prematurely lost was of the total deciduous teeth present plus those that were prematurely lost. In the first case one gets the percentage of caries actually present, but in the second case the percentage of caries is slightly smaller, but one can add the percentage of premature loss to it.

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It is difficult to determine what constitutes premature loss and it must depend a great deal on individual judgment. If the space left by the deciduous tooth was partially or wholly closed, or if one could neither see nor feel the unerupted permanent tooth or that its eruption was likely not to take place for several months I considered the deciduous tooth prematurely lost. This premature loss I considered one of the most important parts of the investigation because the majority of the severe cases of malocclusion seemed to be a direct result of it.

In the graph Fig. 13 you will notice that the percentage of caries of the deciduous teeth of the school children and welfare centre children of the total present plus lost in each year is considerably lower than that of

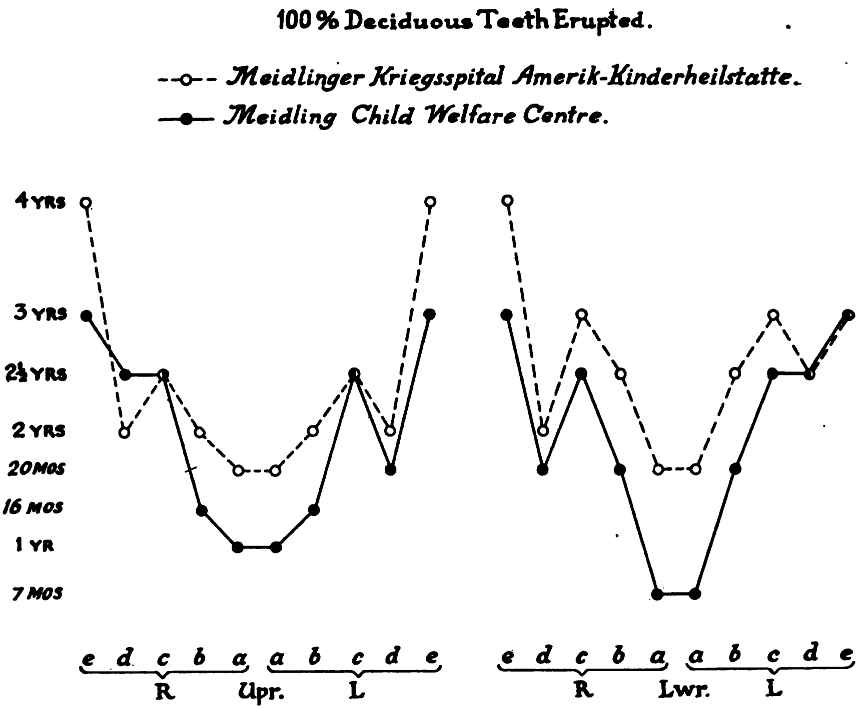

Fig. 5.

the investigation of Cunningham at the Cambridge Dental Institute, England, British Dental Journal, 1905, but when the premature loss is added the curves are very similar. In the other graph, Fig. 14, the percentage of caries of deciduous teeth in the school children and welfare centre children of the deciduous teeth present plus lost is compared with the percentage of caries of the hospital children; the actual caries of the hospital children is somewhat less than in the school children, but the premature loss is very much greater.

Graph Fig. 15 compares the percentage of caries of the total deciduous teeth present of the welfare centre children, and the school children with the hospital children, and with the statistics of Cunningham.

Graph Fig. 16 compares the percentage of loss of the deciduous teeth

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of the school children and child welfare centre with the hospital children. The percentage of loss of the hospital children is very much greater, and one can imagine the tremendous drifting of the remaining teeth. I shall refer to this matter later.

The graph demonstrating the percentage of caries of the permanent teeth shows that the Vienna school children and hospital children had a very much lower percentage than the English children.

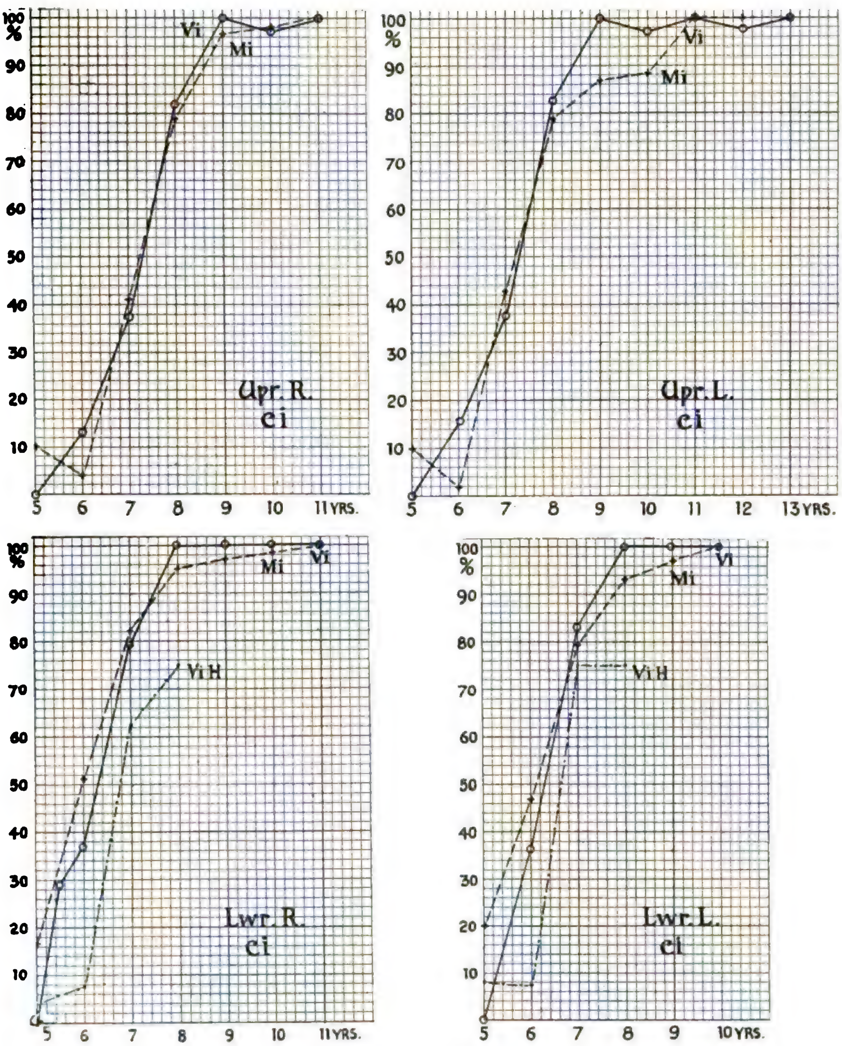

Fig. 6.—Percentage of eruption at each year. Central incisors.

In examining the teeth for caries one noticed in the very badly nourished children that they were very liable to a cervical caries of the deciduous teeth.

The children of the hospital who had very bad rickets had frequently very unhealthy gums. Not only a marginal gingivitis but the whole gum was inflamed (Fig. 17).

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Where the deciduous teeth were falling out prematurely the teeth were greatly stripped, i.e., recession of the gum, and a large amount of the root was not absorbed. There seemed to be no very great discharge from the

TABLE III

MEIDLING CHILD WELFARE CENTRE, VIENNA

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	20	20	40	20	...	...	...
	...	...	...	66.66	100	100	50	...	...	...
	...	73.33	33.4	100	100	100	100	33.33	80	...
	...	100	...	100	100	100	100	...	100	...
	40	80	60	100	100	100	100	60	100	40
	71.4	100	100	100	85.71	85.71	100	100	100	71.42
Prematurely lost	...	...	...	...	14.2	14.2	...	...	...	...
	100	100	100	100	100	100	100	100	100	100
	100	100	100	100	100	100	100	100	100	100
Prematurely lost	...	...	...	...	...	...	...	...	...	...
	100	100	100	100	100	100	100	100	100	100
Prematurely lost	...	...	...	...	...	...	...	...	...	...

PERCENTAGE OF PERMANENT TEETH PRESENT OF TOTAL CASES EXAMINED IN EACH YEAR

UPPER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI
8.5	...	...	...	...	...	...	...	...	...	...	5.7

TABLE IV

VIENNA SCHOOL CHILDREN

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	100	86.8	100	84.3	79	76.3	92.2	100	94.8	100
Prematurely lost	...	13.2	...	13.2	7.9	7.9	7.9	...	5.2	...
	100	91.6	95.8	70.9	45.9	37.5	66.7	91.6	79.2	87.5
Prematurely lost	...	8.3	4.1	12.5	16.7	25	12.5	8.3	8.3	8.3
	69.6	65.2	100	30.4	13.1	17.4	52.2	87	65.2	82.6
Prematurely lost	21.8	13.1	...	17.4	4.3	...	...	13.1	21.8	13.1
	77	86.7	89.8	7.7	...	...	7.7	87.2	56.5	77
Prematurely lost	12.8	10.2	5.1	12.8	...	...	7.7	7.7	12.8	10.3
	50	38.9	69.5	5.5	2.7	...	2.7	66.1	38.9	52.8
Prematurely lost	13.9	5.5	5.5	5.5	...	2.7	5.5	19.5	2.7	16.7
	37.2	14.3	42.9	...	...	...	...	42.9	14.3	31.4
Prematurely lost	...	5.7	22.9	2.8	...	...	...	28.6	2.8	2.8
	19.5	9.7	31.7	2.4	...	2.4	2.4	36.6	7.3	9.7
Prematurely lost	4.8	...	12.2	...	...	...	...	12.2	2.4	4.8
	8.3	8.3	33.4	...	...	...	...	37.5	8.3	8.3
Prematurely lost	4.1	4.1	...	...	...	...	...	...	...	4.1

PERCENTAGE OF PERMANENT TEETH PRESENT OF

UPPER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
...	55.3	...	...	...	2.6	13.2	15.8	...	...	...	...	50	...
...	83.3	...	...	...	16.7	37.5	37.5	20.9	...	12.5	4.17	75	...
...	100	8.7	21.8	...	52.2	82.7	82.7	47.8	...	21.8	4.35	100	...
...	97.5	12.8	23.1	5.1	79.5	100	100	84.6	5.1	30.8	18	97.5	...
2.7	100	36.1	58.3	25	89	97.2	97.2	91.7	19.5	66.7	30.6	100	...
2.8	100	65.7	83	34.3	97.2	100	100	100	28.6	85.8	71.5	100	8.5
29.3	100	78.1	90.3	56.1	97.6	100	97.6	97.6	51.2	90.3	90.3	100	29.3
66.7	100	87.5	87.5	66.7	100	100	100	95.8	58.3	91.7	87.5	91.7	62.5

gums, but what there was, was of a serous form. Many cases were seen where only four or six deciduous molars were left standing.

Lawson Dick in his book on "Defective Housing and the Growth of Children" calls special attention to the amount of hypoplasia present of the type which has been associated with rickets. He considers that only

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some condition of very long standing could produce such large hypoplastic areas. A fever might produce hypoplasia, but it would be in the form of a line, or line of pits, whereas rickets produces a large honeycombed area

TABLE III—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
...	...	...	20	100	100	20	...	...	...	7-12 mths.	5
...	...	...	50	100	100	50	...	...	...	12-16 "	6
...	80	33.33	93.33	100	100	80	33.33	80	...	16-20 "	15
...	100	...	100	100	100	100	...	100	...	20-24 "	2
60	80	60	100	100	100	100	60	60	40	2 -2½ yrs.	5
71.42	100	100	100	100	100	100	100	100	71.42	2½-3 "	7
...	...	...	...	...	...	...	...	...	...		
100	100	100	100	100	100	100	100	100	100	3 -4 "	18
95.6	100	100	100	100	100	100	100	100	100	4 -5 "	23
4.3	...	...	...	...	...	...	...	...	...		
97.1	97.1	97.1	100	91.4	91.4	97.1	97.1	97.1	94.2	5 -6 "	35
2.8	2.8	2.8	...	...	...	2.8	2.8	2.8	5.7		

LOWER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI	AGE	NO. EXAMINED
8.5	...	...	...	...	8.5	8.5	...	...	...	...	8.5	5-6 years	35

TABLE IV—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
92.2	94.8	100	84.3	57.9	57.9	79	100	97.4	97.4	6 years	38
7.9	5.2	...	...	5.2	5.2	.2	...	2.6	2.6		
83.4	83.4	91.6	66.7	20.8	16.7	66.7	95.8	83.4	66.7	7 "	24
16.7	16.7	4.1	4.1	...	...	4.1	4.1	16.7	33.4		
74	87	95.8	13.1	...	...	13.1	91.3	78.3	56.5	8 "	23
26.1	13.1	4.3	...	...	...	...	...	17.4	43.5		
53.9	59	74.4	2.5	...	...	2.5	79.6	71.8	43.6	9 "	39
33.4	25.6	10.3	...	...	...	...	5.1	7.7	43.6		
55.6	47.3	41.7	...	...	...	...	47.3	58.3	50	10 "	36
25.	13.9	5.5	...	...	...	...	5.5	8.3	30.6		
25.7	17.2	31.4	...	...	...	...	25.7	25.7	14.3	11 "	35
34.3	20	5.7	...	...	...	...	8.5	22.9	51.5		
17.1	9.7	14.7	...	...	...	...	19.5	14.7	17.1	12 "	41
24.4	7.3	...	...	...	...	...	...	7.3	24.4		
8.3	8.3	12.5	...	...	...	4.1	16.7	8.3	8.3	13 "	24
12.5	4.1	...	4.1	...	...	...	...	8.3	20.9		

TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	AGE	NO. EXAMINED
...	50	...	...	...	15.8	36.8	36.8	15.8	...	...	...	60.5	...	6 yrs.	38
...	75	...	...	4.1	29.2	79.2	83.3	29.2	...	...	...	83.3	...	7 "	24
...	100	...	...	...	87	100	100	87	8.7	8.7	...	95.7	...	8 "	23
2.57	97.5	12.8	18	15.4	97.5	100	100	97.5	15.4	20.5	15.4	97.5	...	9 "	39
5.5	100	25	44.5	52.8	100	100	100	100	47.3	33.4	19.5	100	8.3	10 "	36
31.4	100	45.7	62.9	62.9	100	100	100	100	65.7	54.3	34.3	100	25.8	11 "	35
43.9	100	63.4	85.4	85.4	100	100	100	100	80.6	80.6	61	100	46.4	12 "	41
75	100	79.2	87.5	87.5	95.8	100	100	100	87.5	83.3	70.8	100	75	13 "	24

or a condition as if the ends of the teeth had been half eaten by some animal. The majority of hypoplasia in the permanent teeth, which I saw, was of this nature. In the deciduous teeth it took the form of pitting or honeycombing.

Very little hypoplasia was to be seen in the teeth of the welfare centre

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children, about 3.4 per cent. In the hospital children about 5.9 per cent and in the school children about 28.4 per cent. Fifty per cent of these latter had hypoplasia of the deciduous teeth and 82 per cent had hypoplasia of the permanent teeth. One must remember that the majority of the hypoplasia of the deciduous teeth must have occurred before birth between the fifth and ninth month of intrauterine life, and that it was prob-

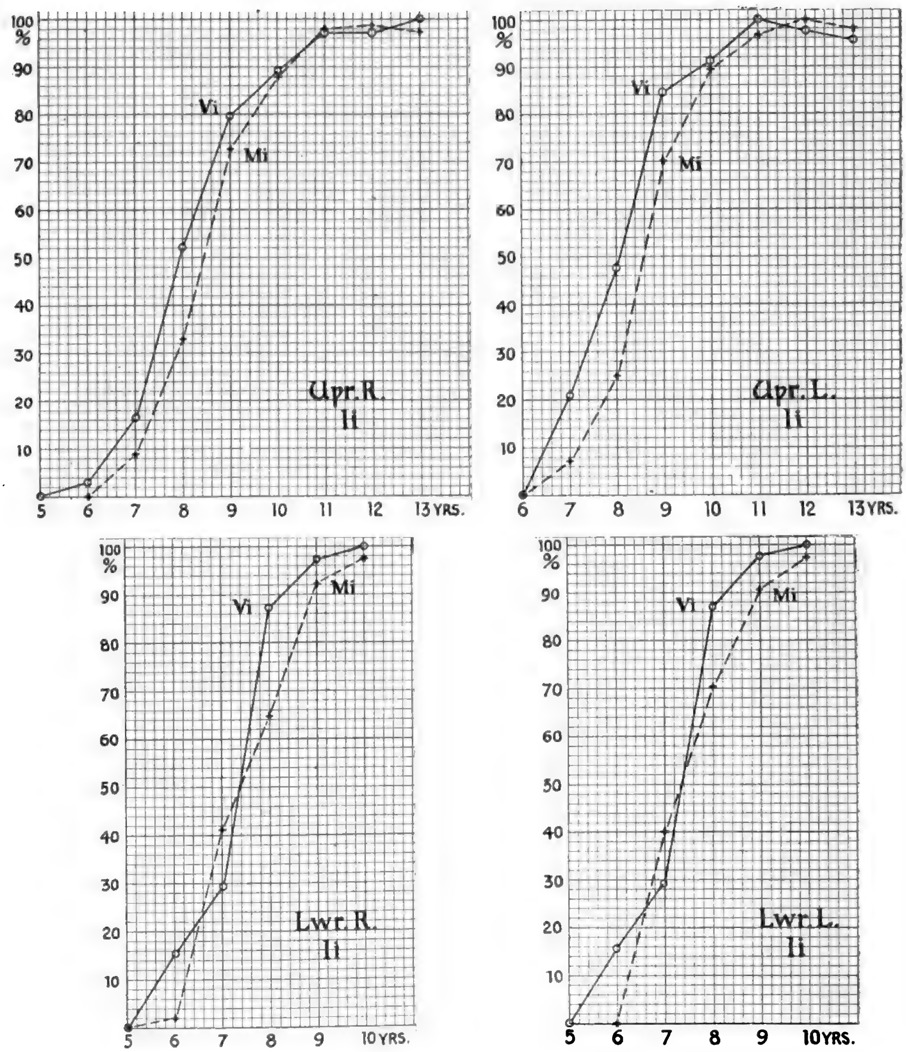

Fig. 7.—Percentage of eruption at each year. Lateral incisors.

ably the result of the undernourishment of the mother, whereas the hypoplasia of the permanent teeth nearly always occurred after birth.

Lawson Dick also attaches importance to the "white patches" frequently seen on children's teeth which are probably due to some form of faulty calcification. In the Vienna children the percentage of children that had white patches was 5 per cent child welfare, 13.2 per cent school children, and 7.4 per cent hospital children. Lawson Dick gives the percentage

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of the children he examined as 28.5 per cent. In many of the cases where "white patches" were seen they occurred on single teeth. It is difficult to account for their presence especially in the deciduous denture.

A considerable amount of brown and green stains, especially around the cervical margins, were seen which are probably due to some action of Cromogenic bacteria. I think the Brown striae of Retzius said to have

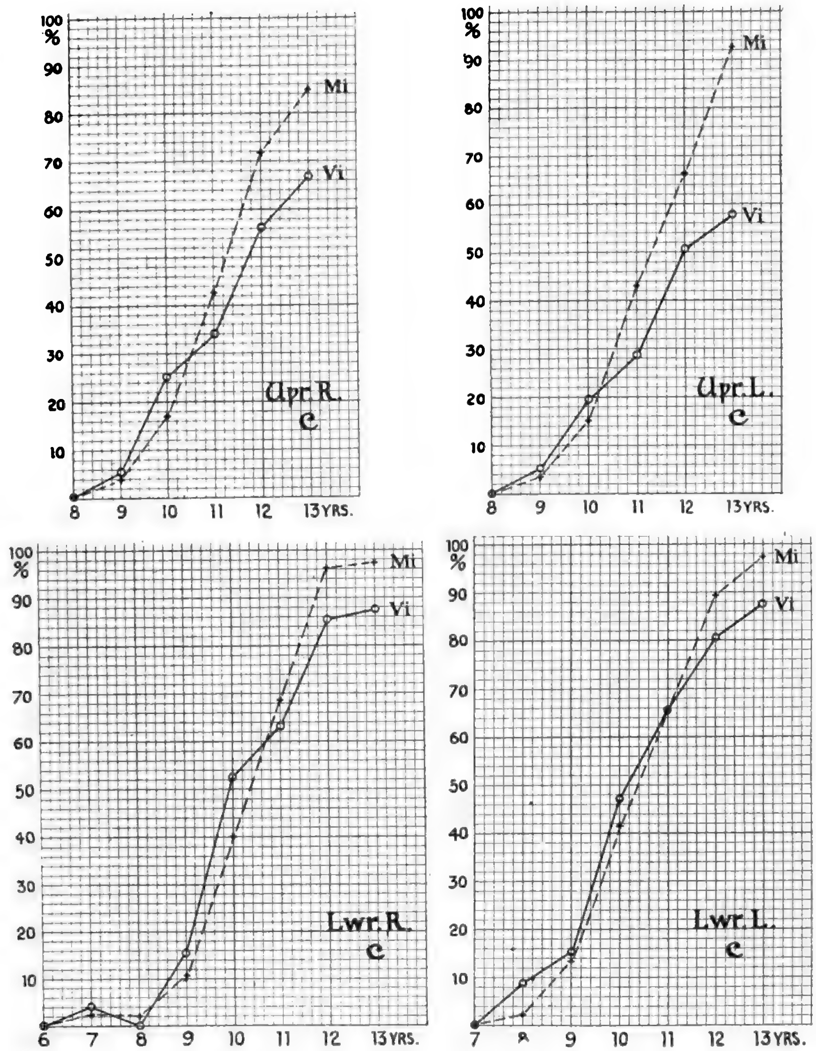

Fig. 8.—Percentage of eruption at each year. Canines.

been seen by Lawson Dick was really these stains, as I do not think the striae of Retzius can be seen except in sections and magnified by the microscope. According to Norman Bennett the striae are more marked in hypoplastic teeth, but Hopewell-Smith considers the reverse is the case.

The last part of the investigation and the part which is of most interest to our specialty is the most difficult to describe.

That is the maldevelopment of jaws, and the malocclusion of the teeth.

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Table V

Meidlinger Kriegsspital Amerik-Kinderheilstatte (Hospital Children Vienna)

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	50	75	75	50	...	12.5	...
	...	50	8.3	66.6	91.6	91.6	66.6	8.3	50	...
	...	50	12.5	87.5	100	100	87.5	12.5	50	...
	12.5	100	50	100	100	100	100	50	100	12.5
	83.3	100	100	100	100	100	100	100	100	83.3
Present	93.7	100	87.5	87.5	87.5	81.2	81.2	100	100	93.7
Prematurely lost	...	...	6.2	12.5	12.5	18.7	18.7	...	...	...
Present	96.1	100	84.6	88.4	88.4	88.4	92.3	84.6	100	100
Prematurely lost	...	...	15.3	11.5	11.5	11.5	7.6	15.3	...	...
Present	96	88	88	88	84	80	88	84	92	96
Prematurely lost	4	12	12	12	16	20	12	16	8	4
Present	100	76.9	100	69.2	30.7	38.4	69.2	100	76.9	100
Prematurely lost	...	23.1	...	30.7	69.2	61.5	30.7	...	23.1	...
Present	100	100	100	100	62.5	62.5	87.5	100	87.5	100
Prematurely lost	...	...	...	...	25	25	...	...	12.5	...
Present	100	100	50	25	...	...	25	25	75	100
Prematurely lost	...	...	50	25	75	75	25	75	25	...

PERCENTAGE OF PERMANENT TEETH PRESENT OF

UPPER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
...	8	...	...	...	...	...	...	...	...	...	...	8	...
...	23.1	...	...	...	...	...	...	...	...	...	...	15.3	...
...	75	...	...	...	...	12.5	12.5	12.5	...	...	...	75	...
...	50	...	...	...	50	25	25	50	...	...	...	50	...
...	100	...	...	...	100	100	100	100	...	100	...	100	...
...	100	...	...	...	100	100	100	100	...	...	...	100	...
66.6	100	100	100	100	100	100	100	100	100	100	100	100	100

Table VI

Meidling Child Welfare Centre (Vienna)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	...	...	...	6.6	6.6	6.6	...	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	9	...	8.3	...	...	8.3			
Prematurely lost	...	...	...	...	8.3	8.3	...	...	...	...
Caries	...	5.5	5.5	...	11.1	11.1	...	5.5	5.5	...
Caries	17.3	13	4.3	8.7	13	26.1	8.7	4.3	17.3	17.3
Prematurely lost	...	...	...	...	...	...	...	...	...	...
Caries	22.8	28.5	8.5	25.7	42.8	40	22.8	2.8	34.2	20
Prematurely lost	...	...	...	...	...	...	...	...	...	...
Total percentage of Caries in each tooth for all ages	14.4	15	5.4	10.9	18.9	19.6	11	3.3	16.6	13.2
Total percentage of loss in each tooth for all ages					.9	.8				

I have tried to show you that the children were poorly developed, that the eruption of the teeth was delayed, and that the deciduous teeth were lost prematurely. Was there any type of malocclusion present that it could be definitely stated was the result of the diet?

Mouth breathers were exceedingly rare and there were *few* cases of Class II, Div. I, (Angle) that I thought were sufficiently marked to warrant treatment.

I saw no cases of jaws or teeth that were similar to the case shown

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TABLE V—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
...	...	...	25	75	75	12.5	...	...	...	12-16 mths.	8
...	41.6	...	58.3	91.6	83.3	66.6	...	33.4	...	16-20 "	12
...	37.5	12.5	75	100	100	75	12.5	37.5	...	20-24 "	8
25	100	37.5	87.5	100	100	87.5	50	87.5	37.5	2 -2½ yrs.	8
83.3	100	83.3	100	100	100	100	83.3	100	83.3	2½-3 "	6
93.7	100	100	100	100	100	100	93.7	100	100	3 -4 "	16
...	...	...	...	...	...	...	5.2	...	...		
100	96.1	84.6	92.3	84.6	84.6	96.1	88.4	100	100	4 -5 "	26
...	3.8	15.3	7.6	15.3	15.3	3.8	11.5	...	...		
84	88	96	92	80	72	92	92	88	84	5 -6 "	25
16	12	4	8	16	20	8	8	12	16		
92.3	46.1	84.6	76.9	53.8	61.5	69.2	61.5	61.5	92.3	6 -7 "	13
7.6	53.8	15.3	23.1	38.4	30.7	30.7	38.4	38.4	7.6		
100	75	100	75	25	25	62.5	100	87.5	75	7 -8 "	8
...	25	...	12.5	12.5	...	25	...	12.5	12.5		
50	50	50	25	...	...	25	50	50	50	8 -9 "	4
50	50	50	25	25	25	25	50	50	50		

TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	AGE	NO. EXAMINED
...	8	...	...	...	...	4	8	...	...	...	...	8	...	5- 6 yrs.	26
...	30.7	...	...	...	...	7.6	7.6	...	...	...	...	30.7	...	6- 7 "	13
...	75	...	...	...	12.5	62.5	75	12.5	...	...	12.5	87.5	...	7- 8 "	8
...	50	...	...	...	50	75	75	50	...	...	...	75	...	8- 9 "	4
...	100	100	100	...	100	100	100	100	...	...	...	100	...	9-10 "	1
...	100	...	...	...	100	100	100	100	...	...	100	100	...	10-11 "	1
100	100	100	100	100	100	100	100	100	100	100	100	100	100	13-14 "	3

TABLE VI—CONT'D

PREMATURE LOSS OF TOTAL PRESENT + LOST IN TEMPORARY TEETH

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE OF CARIES AND LOSS IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
...	...	...	...	...	...	...	...	...	...		7-12 mths.	5
...	...	...	...	...	...	...	...	...	...		12-16 "	6
...	...	...	...	...	...	...	...	...	...	1.6	16-20 "	15
...	...	...	...	...	...	...	...	...	...	...	20-24 "	2
12.5	...	...	...	8.3	8.3	8.3	...	...	14.2	3.8	2 years	12
...	...	...	...	...	...	...	...	...	...	.95		
44.4	38.8	...	...	...	...	...	...	27.7	50	10.2	3 years	18
36.3	47.8	...	4.3	4.3	4.3	4.3	...	34.7	43.4	15.2	4 years	23
4.3	...	...	...	...	...	...	...	...	...	.21		
64.7	55.8	2.9	...	...	...	...	2.9	47	69.6	24.6	5 years	35
2.8	2.8	2.8	...	...	...	2.8	2.8	2.8	5.7	1.1		
.47.5	37	1.1	.9	1.7	1.7	1.9	1.1	29.2	53.1	14.5	Total percentage of Caries found in all teeth for all ages.	
2.3	.9	1.08	...	...	...	.9	1.08	1	2.4	.55	Total percentage of Premature Loss in all teeth for all ages.	

in Dewey's Practical Orthodontia, page 120, fourth edition, as the result of rickets. I think the fact has been overlooked that the deformity produced in bones by rickets is not caused by the pull of the muscles but by the weight above the part such as that seen in the long bones of the legs or in the long bones of the arms. In both cases it is produced by the weight of the trunk during either walking or crawling.

One must also remember that the muscles become weak and flabby and that possibly some of the chest deformities are due to the want of tone of

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the chest muscles so that they are not able to counteract the elasticity of the ribs.

A couple of cases of open-bites were seen that were the nearest resemblance to the so-called rickety jaw, but the open bite was very slight. This bears out Hatfield's examination.[6] The main malocclusion of a serious nature which I saw was the result of premature loss of deciduous teeth. Again,

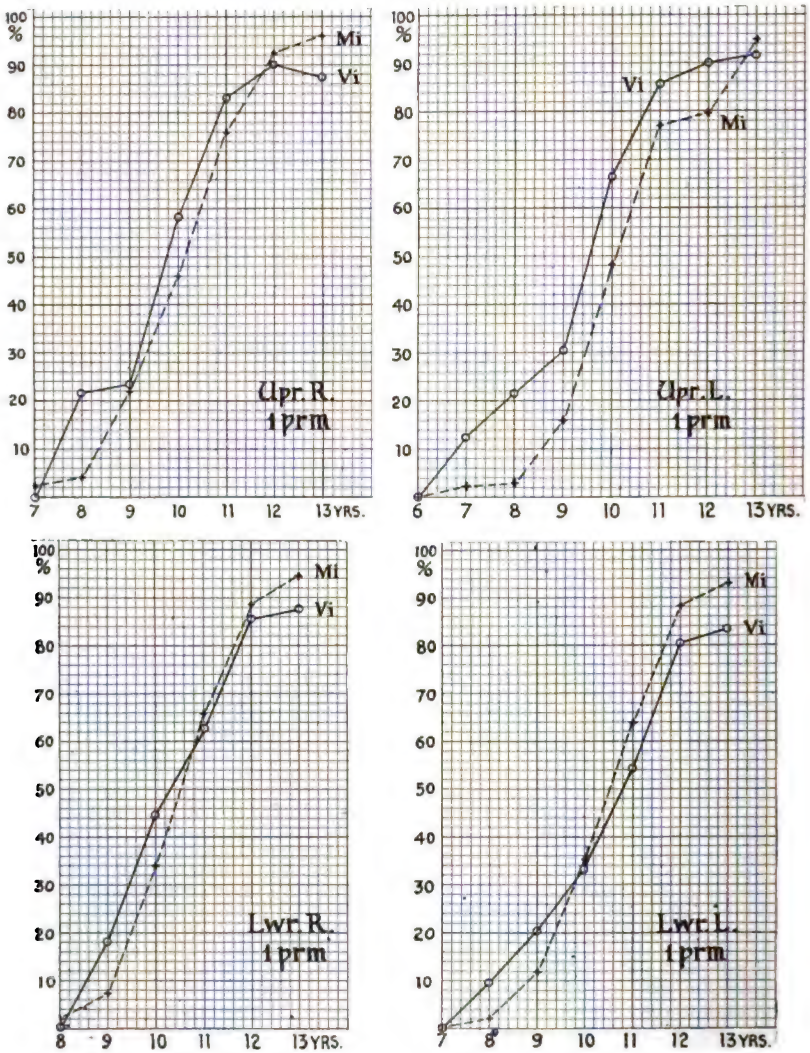

Fig. 9.—Percentage of eruption at each year. First Premolars.

like the premature loss, the diagnosis of the malocclusion was a matter of individual judgment. Owing to certain conditions it was found impossible to obtain impressions of the children's mouths, and I had to form my opinion of the cause of the malocclusion when seeing the child.

The children to whom I wish particularly to draw your attention are those under six years of age. They are the children whose whole lives have

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been affected by the war diet. If any malocclusion were present it would be of the deciduous teeth as so few permanent teeth were erupted.

I will first bring to your notice the welfare centre children—121 children were examined. Thirteen, or 10.7 per cent, cases of malocclusion were seen, all Class I cases (Angle's classification). In two of these cases the malocclusion was due to abnormal attachment of the frenum causing

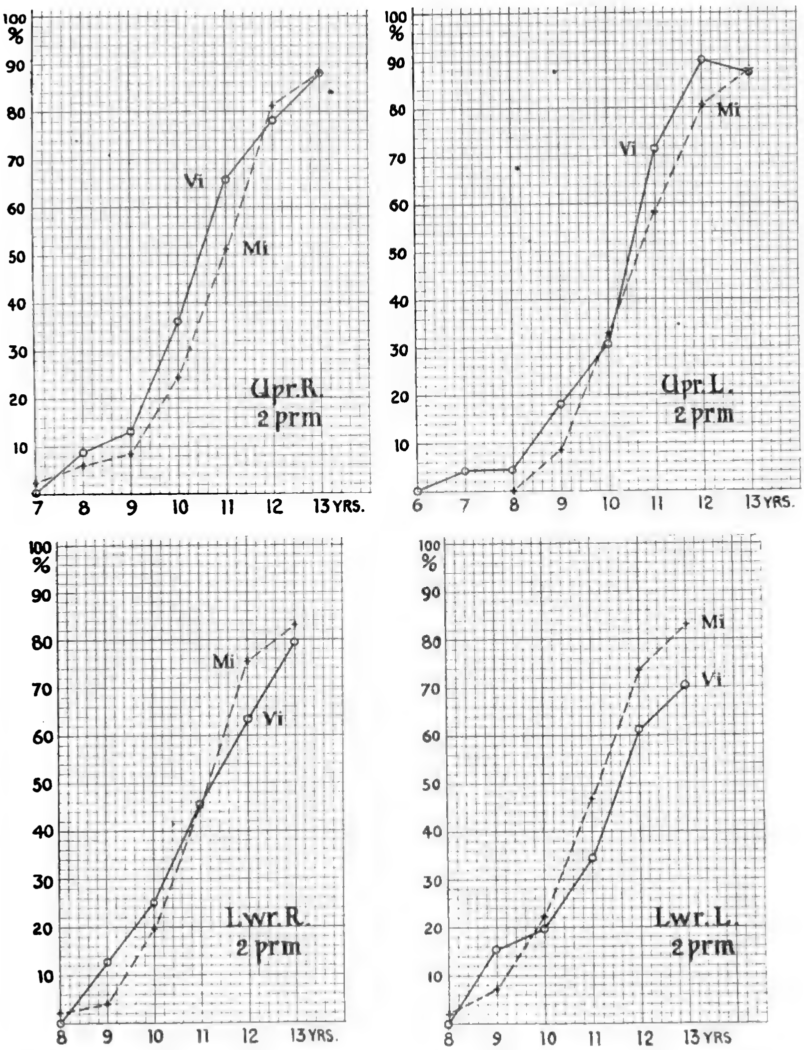

Fig. 10.—Percentage of eruption of each year. Second premolars.

separation of the central incisors. In one case it was due to a supernumerary lateral incisor in lingual occlusion. In three cases there was slight protrusion of maxillary incisors due to thumb sucking. In one case there was slight protrusion of maxillary incisors due to mouth breathing, no history of thumb-sucking. In the remaining six cases the malocclusion consisted of very slight crowding of the incisors chiefly rotation of mandibular central incisors with the mesial angles lingual.

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In all these cases the malocclusion was insignificant and in no case was there maldevelopment of thé jaws.

The premature loss of deciduous teeth with these children was relatively small .55 per cent. Most of these children had rickets to a small degree.

The condition of the hospital children was very different. The premature loss of deciduous teeth amounted to 9.8 per cent. The number of children examined was 134 aged one year to eight years. Thirty-three cases,

TABLE VII

SCHOOL CHILDREN (VIENNA)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND PREMATURE

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
Caries	42.4	33.4	18.4	25	40	34.5	28.6	13.2	47.2	42.1
Prematurely lost	...	13.2	...	13.5	9.1	9.4	7.8	...	5.3	...
Caries	58.3	50	17.4	41.2	45.5	33.4	43.8	18.2	52.7	57.1
Prematurely lost	...	8.3	4.1	15	26.7	40	15.8	8.3	9.5	8.7
Caries	62.5	60	17.4	...	...	...	...	10	60	84.2
Prematurely lost	23.8	16.7	...	36.4	25	...	...	13.1	25	13.7
Caries	70	34.6	11.4	...	...	...	...	26.5	59.1	80
Prematurely lost	14.3	13.3	5.4	62.5	...	...	50	8.1	18.5	11.8
Caries	55.5	21.4	8	...	...	...	100	13.6	42.8	52.6
Prematurely lost	21.8	12.5	7.41	50	...	100	66.7	24.2	6.6	24
Caries	61.5	80	26.7	...	...	...	...	40	80	100
Prematurely lost	...	28.5	34.8	100	...	...	...	40	16.6	8.3
Caries	62.5	75	38.4	...	...	...	...	20	66.8	75
Prematurely lost	20	...	27.7	...	...	..	...	25	25	33.4
Caries	100	100	37.5	...	...	...	...	33.4	100	50
Prematurely lost	33.4	33.4	...	...	...	...	...	...	...	33.4
Total percentage of Caries in each tooth from 6-14 years	59.1	43	18.3	24.2	37.8	30.3	26.5	20	54.3	64.6
Total percentage of premature loss in each tooth from 6-14 years	10.8	13.6	9.1	24.4	15.1	18.9	13.9	14.6	11.5	11.7

PERCENTAGE OF CARIES FOUND IN EACH PERMANENT TOOTH

UPPER JAW

	VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	25	...	...	...	...	...	...	...	...	33.4	...	16.7	...
	...	34.8	...	20	...	...	...	...	...	...	...	...	34.8	...
	...	42.1	...	...	...	...	...	...	...	...	...	...	34.3	...
	...	36.1	...	...	...	...	2.8	...	...	...	...	...	31.5	...
	...	37.2	...	10.4	...	...	2.8	2.8	2.8	...	6.6	...	22.9	...
	...	63.4	9.3	5.4	...	7.5	14.6	10	12.5	...	8.1	8.1	61	...
	6.25	70.8	...	9.5	...	4.1	16.7	16.7	4.3	...	4.5	23.8	59.1	13.4
Total percentage in each tooth from 6-14 years	3.3	41.2	3.1	6.5	...	2.2	5.8	4.3	3.8	...	5.2	7.7	34.9	6.6

or 25 per cent, of malocclusion were seen, sometimes accompanied by maldevelopment of the jaws. Fifteen cases, or 11.6 per cent, were the result of premature loss of deciduous teeth. Of the latter 10 or 11 cases came under Class I and 4 or 5 cases under Class III. In each of the five cases there had been an extensive loss of anterior deciduous teeth.

The greatest number of these cases of malocclusion occurred in children

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aged five or six years, one case occurred at the age of three years, two at four years, and one at eight years.

The deformity in some cases was very great.

The 18 cases where the malocclusion was not due to premature loss were classified as follows:

15 under Class I.
1 under Class II, Div. I.
2 under Class III, (one of these possibly a wrong bite).

TABLE VII—CONT'D

LOSS OF TOTAL PRESENT + LOST FOUND IN EACH TEMPORARY TOOTH

LOWER JAW												
e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
68.6	55.6	13.2	12.5	4.5	9.1	13.3	7.9	75.7	81.1	34.9	6 years	38
7.9	5.3	..	..	8.3	8.3	6.3	..	2.6	2.6	4.5		
70	70	9.1	6.3	..	25	6.3	4.4	70	81.3	39.9	7 years	24
16.7	16.7	4.35	5.9	..	..	5.9	4.1	16.7	33.4	12.4		
82.4	70	9.1	..	..	..	..	4.8	55.5	76.8	40.3	8 years	23
26.1	13.1	4.3	..	..	..	..	..	18.2	43.5	16.1		
76.2	65.2	3.4	..	..	..	..	6.4	57.2	76.5	42.8	9 years	39
38.2	30.3	12.1	..	..	..	..	6	9.6	50	19.3		
70	53	20	..	..	..	..	5.8	52.4	72.2	38.4	10 years	36
31.1	22.8	11.8	..	..	..	..	10.5	12.5	37.9	21.2		
66.7	66.7	36.4	..	..	..	..	33.4	88.9	60	57.5	11 years	35
57.1	53.8	15.4	..	..	..	..	25	47	78.2	38.3		
57.1	75	..	..	..	..	..	25	33.4	85.7	43.2	12 years	41
58.8	42.8	..	..	..	..	..	..	33.4	63.1	31.8		
100	50	..	..	..	..	..	..	..	100	32.2	13 years	24
60	33.4	..	100	..	..	..	..	50	71.4	26.8		
71.8	62.5	11.6	32.9	3.7	11.5	9.8	8.6	63.1	78.3	39.8	Total percentage of Caries found in all teeth for all ages.	
31.4	21.5	6.5	3.7	6.9	7.1	5.6	5	16.6	41	16.1	Total percentage of premature loss in all teeth for all ages.	

LOWER JAW															
VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	TOTAL PERCENTAGE IN ALL TEETH FOR EACH YEAR	AGE
...	15.8	...	...	...	...	...	...	...	...	...	...	26.1	...	6.7	6 yrs.
...	38.9	...	...	...	...	...	...	...	...	...	...	35	...	14.3	7 "
...	56.5	...	...	...	...	...	...	...	...	...	...	50	...	16.1	8 "
...	80	...	...	...	...	...	...	...	...	...	16.7	65.8	...	15.9	9 "
...	72.2	...	...	...	...	...	...	...	...	...	...	66.7	...	12.6	10 "
...	82.9	...	...	...	5.7	5.7	5.7	2.8	4.3	...	8.3	82.9	...	14	11 "
...	83	15.4	5.7	...	...	...	...	...	...	3	4	90.3	5.3	17.6	12 "
22.2	87.5	...	4.7	4.7	4.3	4.1	4.1	4.1	...	5	17.7	91.6	38.9	19.7	13 "
12	68.8	5.3	2.9	.96	1.46	1.3	1.3	.97	.98	2.13	8.95	67.3	16.4	15.6	Total percentage of Caries found in all teeth for all ages.

The malocclusion in the Class I cases consisted of slight crowding of incisors in nine of the children, one case had a marked over-bite of the incisors, one case had an open bite due to sucking fingers, and two other cases had open bite which did not extend further back than the canines. The remaining two Class I cases had lingual occlusion of the maxillary central incisors in one case and one maxillary central in the other.

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Again in all these cases the malocclusion was very slight and there was no maldevelopment of the jaws.

The Class II, Div. I case was very slight.

One of the Class III cases I thought was a wrong bite but I could not succeed in getting any other.

The other case had slight crowding of maxillary and mandibular in-

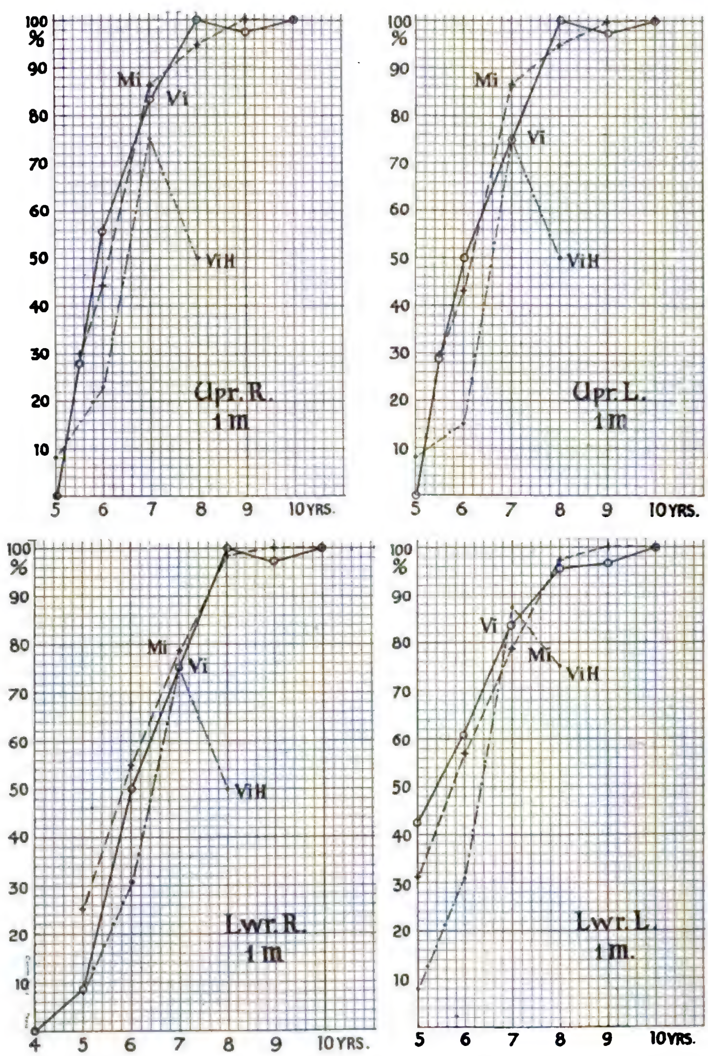

Fig. 11.—Percentage of eruption at each year. First premolars.

cisors, labial occlusion of $\overline{\text{c, b}}\,|$ and edge to edge occlusion of $\left|\dfrac{\text{b c}}{\text{b c}}\right.$ and mesial relation of lower jaw and molars.

It does not seem to me that there is an abnormal percentage of malocclusion among either of these two groups of children, except that due to premature loss of deciduous teeth.

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The child welfare group had 10.7 per cent and the Meidling Hospital children had 13.4 per cent exclusive of those caused by premature loss. The malocclusion in practically all cases was very slight and in some of these cases the natural spacing of the incisors was taking place. This again is exclusive of malocclusion the result of premature loss.

In the school children aged six years to fourteen years 266 cases were

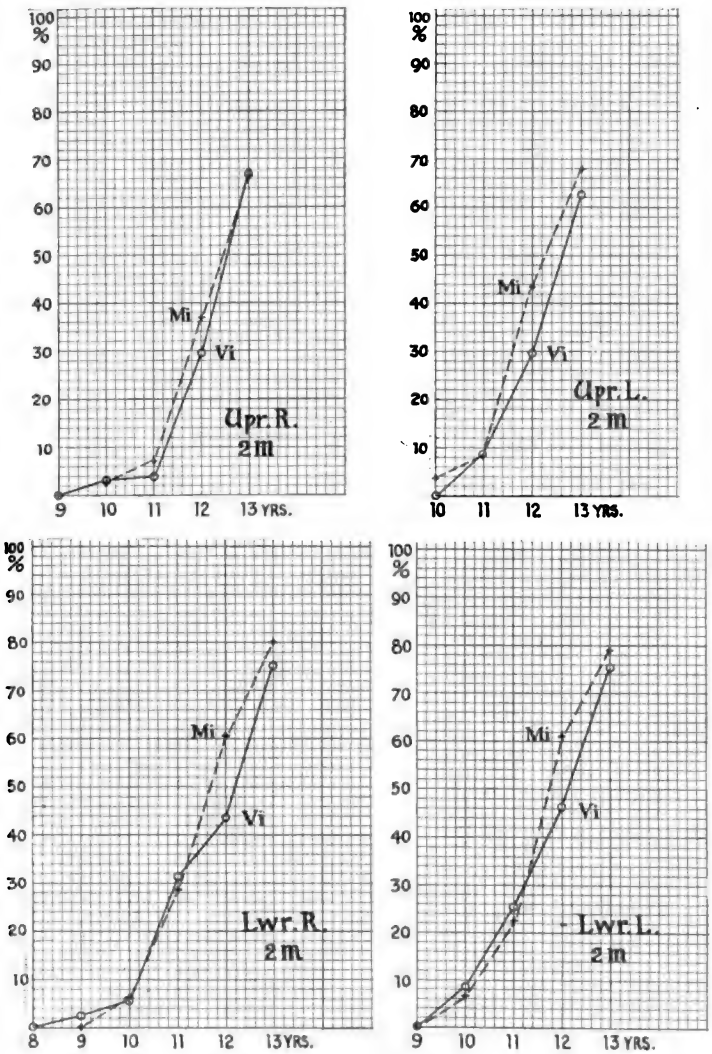

Fig. 12.—Percentage of eruption at each year. Second molars.

examined. Fifty-one and eight-tenths of malocclusion was seen; 19.9 per cent of this malocclusion was due to premature loss of teeth and 31.9 per cent was due to other causes.

All the cases, except one, which were due to premature loss were classified under Class I. The one case came under Class III.

The malocclusion due to other causes was classified as follows:

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Class I.	72 cases
Class II.	7 cases
Class III.	6 cases

Of the 72 cases, 9 cases were due to purely local causes, such as ab-

TABLE VIII
MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND PREMATURE
UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	. .	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	...	...	14.2	21.4	21.4	21.4	...	...	...
Caries	...	6.2	14.2	14.2	28.5	30.7	15.3	12.5	6.2	...
Prematurely lost	...	...	6.6	12.5	12.5	18.7	18.7	...	...	...
Caries	8	11.5	4.5	17.3	26.08	30.4	20.8	4.5	11.5	15.3
Prematurely lost	...	...	15.3	11.5	11.5	11.5	7.6	15.3	...	...
Caries	12.5	9.09	9.09	27.2	33.4	40	27.2	9.5	8.6	16.6
Prematurely lost	4	12	12	12	16	20	12	16	8	4
Caries	38.4	50	7.6	44.4	50	60	44.4	7.6	40	38.4
Prematurely lost	...	23.07	...	30.7	69.2	61.5	30.7	...	23.07	...
Caries	25	50	25	12.5	...	...	28.5	12.5	57.1	37.5
Prematurely lost	...	...	...	...	28.5	28.5	...	...	12.5	...
Caries	25	25	...	...	...	...	...	...	33.4	...
Prematurely lost	...	...	50	50	100	100	50	75	25	...
Total percentage of Caries in each tooth for all ages	13.6	14.5	8.6	17.2	20.7	23.8	20.1	7.5	13.6	16.6
Total percentage of loss in each tooth for all ages	1.04	5.1	9.7	10.5	17.7	18.6	10.6	10.5	5.9	1.03

PERCENTAGE OF CARIES FOUND IN THE PERMANENT TEETH
UPPER JAW

	VI	V	IV	III	II	I	I	II	III	IV	V	VI
	50	...	...	...	...	...	...	...	...	...	...	50
	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Total percentage of Caries found in each tooth for all ages.	7.5	...	...	...	...	...	...	...	...	...	...	8.3

TABLE IX
MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA)

PERCENTAGE OF CARIES OF TEMPORARY TEETH PRESENT + PREMATURELY LOST
UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
	...	...	...	14.2	21.4	21.4	21.4	...	...	...
	...	6.2	13.3	12.5	25	25	12.5	12.5	6.2	...
	8	11.5	3.8	15.3	23.1	26.9	19.2	3.8	11.5	15.3
	12	8	8	24	28	32	24	8	8	16
	38.4	38.4	7.6	30.7	15.3	23.07	30.7	7.6	30.7	38.4
	25	50	25	12.5	...	...	28.5	12.5	50	37.5
	25	25	...	...	...	...	...	...	25	...
Total percentage of Caries found in each tooth for all ages	13.5	13.8	7.7	15.4	17.05	19.3	18.03	6.7	12.8	16.4

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normal attachment of frenum; 8 cases of slight protrusion of maxillary incisors, 14 cases of lingual occlusion of maxillary incisors, 5 cases of open bite, 28 cases of crowding or want of development, and the remaining cases of other very slight malocclusions.

TABLE VIII—CONT'D

LOSS OF TOTAL PRESENT + LOST ON TEMPORARY TEETH

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE OF CARIES AND LOSS IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
..	..	..	..	..	..	..	..	..	..		12-16 mths.	8
..	..	..	..	.	..	..	..	..	..		16-20 mths.	11
..	..	..	..	..	..	..	..	..	..		20-24 mths.	8
..	..	..	..	..	..	..	..	..	..	4.8	2 years	16
20	43.7	..	6.2	12.5	12.5	6.2	..	37.5	25	14.4	3 years	14
..	..	..	..	..	..	..	6.2	..	..	3.7		
42.3	24	4.5	..	..	..	..	13.04	42.3	30.7	15.8	4 years	26
..	3.8	15.3	7.6	15.3	15.3	3.8	11.5	..	..	7.3		
47.6	40.9	8.3	..	..	..	..	8.6	45.4	47.6	19.4	5 years	25
16	12	4	8	16.6	21.7	8	8	12	16	11.8		
83.3	50	9.09	..	..	..	..	12.5	75	66.6	33.1	6 years	13
7.6	53.8	15.3	23.07	41.6	33.4	30.7	38.4	38.4	7.6	26.3		
62.5	66.6	..	..	..	..	..	12.5	71.4	100	28.5	7 years	8
..	25	..	14.2	33.4	..	28.5	..	12.5	14.2	8.49		
50	50	..	..	..	..	..	..	50	..	17.6	8 years	4
50	50	50	50	100	100	50	50	50	50	46.8		
43.9	30.3	4.3	.92	1.8	1.9	.93	7.8	38.6	39.5	16.1 Total percentage of Caries found in all teeth for all ages.		
7.1	13.1	8.9	7.6	12.4	11.8	8.5	12.7	8.9	8.08	9.8 Total percentage of premature loss in all teeth for all ages.		

LOWER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI	TOTAL PERCENTAGE OF CARIES FOUND IN ALL TEETH FOR EACH YR.	AGE	NO. EXAMINED
50	..	..	..	..	..	..	..	..	..	..	50	36.3	5 years	25
25	..	..	..	..	..	..	..	..	..	..	...	6.6	6 years	13
...	..	..	..	..	..	..	..	..	..	..	14.2	2.3	7 years	8
...	..	..	..	..	..	..	..	..	..	..	33.4	4	8 years	4
14.2	..	..	..	..	..	..	..	..	..	..	18.7	7.5 Total percentage of Caries found in all teeth for all ages.		

TABLE IX—CONT'D

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE CARIES FOUND IN ALL TEETH EACH YR.	AGE	NO. EXAMINED
..	..	..	..	..	..	..	..	..	..	..	12-16 mths.	8
..	..	..	..	..	..	..	..	..	..	..	16-20 mths.	12
..	..	..	..	..	..	..	..	..	..	..	20-24 mths.	8
..	..	..	..	..	..	..	..	..	..	4.8	2 years	14
20	43.7	..	6.2	12.5	12.5	6.2	..	37.5	25	13.9	3 years	16
42.3	23.1	3.8	..	..	..	..	11.5	42.3	30.7	14.6	4 years	26
40	36	8	..	..	..	..	8	40	40	17.1	5 years	25
76.9	23.07	7.6	..	..	..	..	7.6	46.1	61.5	24.4	6 years	13
62.5	50	..	..	..	..	..	12.5	62.5	85.7	26.1	7 years	8
25	25	..	..	..	..	..	..	25	..	9.3	8 years	4
40.8	26.3	3.9	.8	1.6	1.7	.8	6.8	35.7	36.3	14.5 Total percentage of Caries found in all teeth for all ages.		

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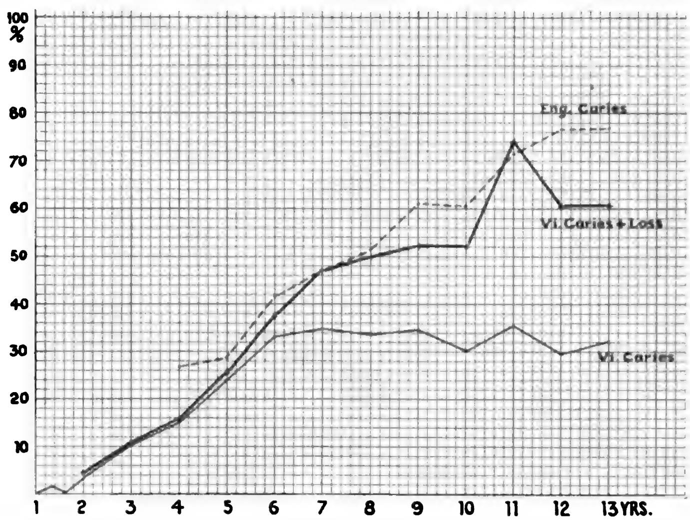

Fig. 13.—Caries; premature loss of deciduous teeth.

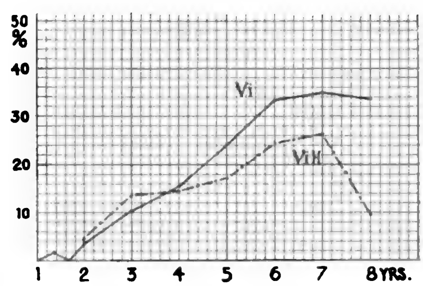

Fig. 14.—Caries in deciduous teeth lost + present.

TABLE X

MEIDLING CHILD WELFARE CENTRE (VIENNA)

Percentage of Caries of Temporary Teeth Present + Prematurely Lost										
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	6.6	6.6	6.6	...	...	...
	...	...	...	...	...	...	...	...	...	...
	...	9	...	8.3	...	...	8.3	...	...	...
	...	5.5	5.5	...	11.1	11.1	...	5.5	5.5	...
	17.3	13	4.3	8.7	13	26.1	8.7	4.3	17.3	17.3
	22.8	28.5	8.5	25.7	42.8	40	22.8	2.8	34.2	20
Total percentage of Caries found in each tooth for all ages	14.4	15	5.4	10.9	18.7	19.4	11	3.3	16.6	13.2

TABLE XI

SCHOOL CHILDREN (VIENNA)

Percentage of Caries of Temporary Teeth Present + Prematurely Lost										
	42.4	28.9	18.4	21.6	36.3	31.2	26.3	13.2	44.7	42.1
	58.3	45.8	16.6	35	33.4	20	36.8	16.6	47.6	52.1
	47.6	50	17.4	...	...	...	...	8.6	45	72.7
	60	30	10.8	...	...	...	...	24.3	48.1	79.5
	43.4	18.7	7.4	...	...	...	33.4	10.3	40	40
	61.5	57.1	17.3	...	...	...	...	24	66.6	91.6
	50	75	27.7	...	...	...	...	15	50	50
	66.6	66.6	37.5	...	...	...	...	33.4	100	33.4
Total percentage of Caries found in each tooth for all ages	52.6	37.1	16.6	18.2	32.6	24.5	22.7	17.07	48	57

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% Caries in total deciduous teeth present.

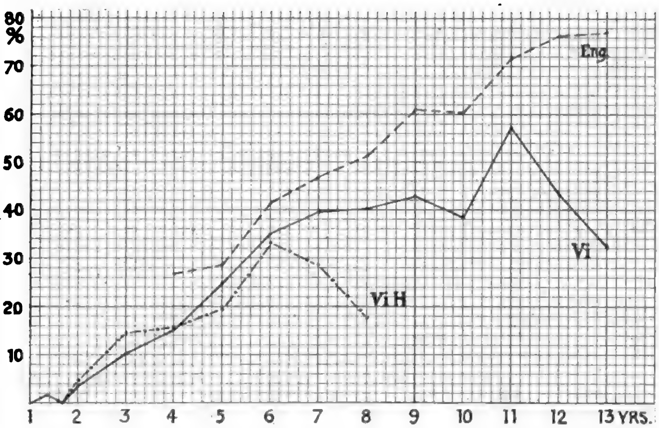

Fig. 15.

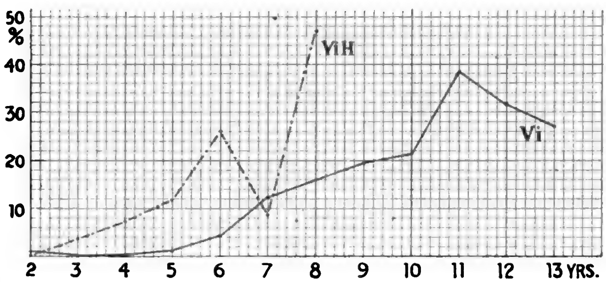

Fig. 16.—Premature loss of deciduous teeth.

TABLE X—CONT'D

..	..	..	..	..	..	..	..	..	..	..	7-16 mths.	11
..	..	..	..	..	..	..	..	..	..	1.6	16-20 mths.	15
..	..	..	..	..	..	..	..	..	..	..	20-24 mths.	2
12.5	..	..	..	8.3	8.3	8.3	..	..	14.2	3.8	2 years	12
44.4	38.8	..	..	..	..	..	..	27.7	50	10.2	3 years	18
34.7	47.8	..	4.3	4.3	4.3	4.3	..	34.7	43.4	15.2	4 years	23
62.8	54.2	2.8	..	..	..	..	2.8	45.7	65.7	24.3	5 years	35
46.4	36.6	1.09	.9	1.7	1.7	1.8	1.09	29	51.8	14.4	Total percentage of Caries found in all teeth for all ages.	

TABLE XI—CONT'D

63.1	52.6	13.2	12.5	4.1	8.2	12.5	7.9	73.6	78.9	33.2	6 years	38
58.3	58.3	8.6	5.8	..	25	5.8	4.1	58.3	54.1	34.9	7 years	24
60.8	60.8	8.6	..	..	..	..	4.8	45.4	43.4	33.8	8 years	23
47.05	45.4	3.03	..	..	..	..	6.06	57.6	38.2	34.5	9 years	39
48.2	40.9	17.6	..	..	..	..	52.6	45.8	44.9	30.2	10 years	36
28.5	30.7	30.7	..	..	..	..	25	47	13.04	35.5	11 years	35
23.2	42.8	..	..	..	..	..	25	22.2	31.5	29.4	12 years	41
40	33.4	..	..	..	..	..	..	..	28.5	32.1	13 years	24
49.2	49.07	10.8	9.2	3.4	10.7	9.2	8.1	52.6	46.1	33.3	Total percentage of Caries found in all teeth for all ages.	

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Of the seven cases of Class II only one case was bad.

The Class III cases were nearly all a very complicated form.

An investigation of this nature is open to much criticism. Many will consider that the number examined is too small from which to draw conclusions but nevertheless I think that you will see many points which are of importance in the problems of etiology and dental caries and malocclusion.

It is possible that vitamines play a very important part in the causation of these diseases. It is probable that all civilized people are suffering from a deficiency of vitamines especially the dwellers in towns.

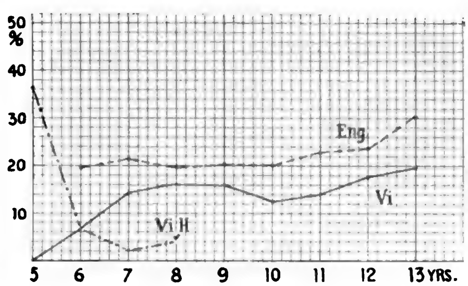

Fig. 17.—Caries in permanent teeth.

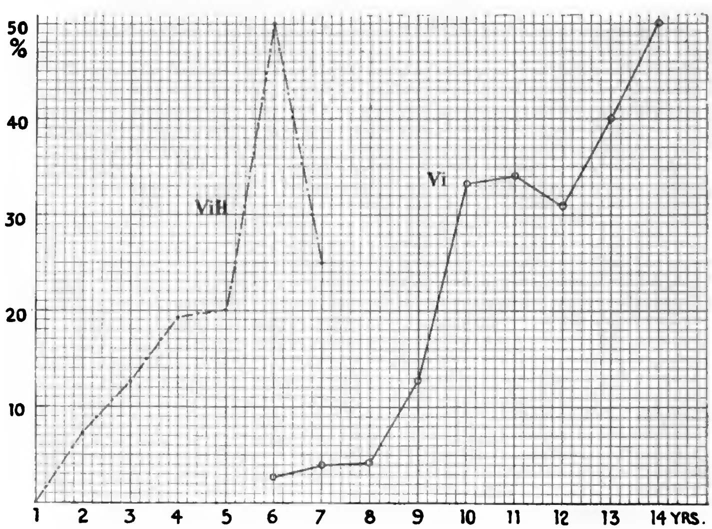

Fig. 18.—Unhealthy gums.

In the country one finds better teeth and better developed arches. I once examined the children attending a school on the west coast of Ireland. They were the sons of small farmers and fishermen. It is a very wild and desolate region and the diet of these people was very primitive.

For breakfast, bread and butter, tea or milk. For dinner, potatoes, salted fish and milk; and on Sundays, potatoes, salted meat, cabbage and milk. For supper, bread and butter, tea or milk. In the winter milk is scarce. The amount of caries was comparatively small. There was practically no malocclusion.

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The conclusions which I draw from the examination of the Vienna children whose diet was very deficient were as follows:

The weight and height were greatly below normal. Rickets, tuberculosis, and anaemia were very prevalent. Mouth breathers were not so frequently met with as in England.

Gingivitis was very common especially in the rickety children.

Hypoplasia and white patches were met with in a high percentage of the children.

Caries was not so prevalent as in England.

The eruption of the deciduous teeth was delayed especially in the rickety children. The eruption of the permanent teeth was also delayed in the rickety children.

TABLE XII

MEIDLING CHILD WELFARE CENTRE (VIENNA)

PERCENTAGE OF CHILDREN WITH UNHEALTHY GUMS
.806 of the total number examined had unhealthy gums. 124 children were examined.

TABLE XIII

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (VIENNA HOSPITAL)

AGE	UNHEALTHY GUMS	NO. EXAMINED
1 year	....	28
2 years	7.14	14
3 years	12.5	16
4 years	19.23	26
5 years	20	25
6 years	53.33	13
7 years	25	8

TABLE XIV

SCHOOL CHILDREN (VIENNA)

AGE	UNHEALTHY GUMS	NO. EXAMINED
6 years	2.63	38
7 years	4	25
8 years	4.16	24
9 years	12.82	39
10 years	33.33	36
11 years	34.28	35
12 years	30.95	42
13 years	40	25
14 years	50.	4

The deciduous teeth were lost prematurely in a large percentage of cases, which is contrary to the results that Mrs. Mellanby obtained in her experiments.

Malocclusion did not seem as marked as in England except that produced by premature loss.

Before concluding I would like to say how grateful I am to Professor von Pirquet, and the Friends' Relief Mission for giving me the facilities to carry out this investigation. All the other Austrian doctors with whom I came in contact gave me the greatest assistance.

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PERCENTAGE OF CHILDREN WITH DEVELOPMENTAL DEFECTS

TABLE XV

Meidling Child Welfare Centre (Vienna)			
Age	Hypoplasia	White Patches	No. Ex.
1 year	.....	12.48	24
2 years	.....	.....	14
3 years	16.66	5.55	18
4 years	.....	.....	22
5 years	2.85	5.7	35
6 years	.....	.....	4

TABLE XVI

Meidlinger Kriegsspital Amerik-Kinderheilstatte (Hospital Children)				
Age	Hypoplasia		White Patches	No. Ex.
	Temporary Teeth	Permanent Teeth		
1 year	....	....	10.71	28
2 years	....	....	7.14	14
3 years	6.25	....	18.75	16
4 years	3.7		3.7	27
5 years	8	4	4	25
6 years	7.69	15.38	7.69	13
7 years	....	12.5	....	8

TABLE XVII

School Children (Vienna)				
Age	Hypoplasia		White Patches	No. Ex.
	Temporary Teeth	Permanent Teeth	Permanent Teeth	
6 years	23.68	13.15	13.15	38
7 years	12	16	....	25
8 years	20.83	29.16	20.83	24
9 years	7.5	35	22.5	40
10 years	5.55	33.33	16.66	36
11 years	....	20	14.28	35
12 years	4.76	23.81	12.04	42
13 years	2.7	22.22	8.33	25

APPENDIX I

The calorie requirement of average civilians. Extracts from "The Feeding of Nations" by Prof. E. H. Starling.

The calorie requirement of an average civilian doing average work is 3000 calories.

The proportion of a child to a man is 0'5 to 0'6.

The calorie requirement of a child is 1500 to 1800 calories, this can be obtained for a man from:

$$\left.\begin{array}{ll}\text{Protein} & 100\ \text{grams}\\ \text{Fat} & 100\ \text{grams}\\ \text{Carbohydrate} & 500\ \text{grams}\end{array}\right\} = 3390\ \text{calories.}$$

The importance of fat. It is stated that a quarter of the total calories of the average diet should be in the form of fat. On this ratio a man should have 75 grams of fat daily (2.6 oz.). A child at the breast takes 50 per cent calories in the form of fat.

The calorie value of the German diet was about 1500 calories per man, and the Austrian diet was very much lower.

APPENDIX II

English rations during part of the war period.

Sugar ½ lb. per week.
Fats 1½ oz. butter per week. Margarine could usually be purchased in addition.
Meat (Butchers) about 1 lb. or somewhat less per week.
(Other meat) about 5 oz. per week.
Jam 12 oz. per six weeks.

Nursing mothers received the food in addition which the child would otherwise have had.

For nursing and expectant mothers milk could be prescribed by a physician.

For expectant mothers extra meat 2 coupons (about 6 oz.) or 1½ oz. butter.

Children under 18 months received 1½ pints milk daily, sold at a reduced price or free.

Over 18 months to 5 years 1 pint daily.

Fresh milk if available, otherwise preserved.

Adequate amount of sugar to be provided at centres for children who were bottle fed.

Bread, potatoes, and vegetables not rationed.

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TABLE XVIII

MEIDLING CHILD WELFARE CENTRE (VIENNA) MALOCCLUSION

AGE	CLASS	
11 mths.	Class I	Frenum separation of a | a
1 yr. 7 mths.	Class I	Protrusion of a | a thumb-sucking
1 yr. 7½ mths.	Class I	Protrusion a | a finger-sucking
2 yrs. 3 mths.	Class I	Frenum separation of a | a
2 yrs. 6 mths.	Class I	Slight rotation of a | a mesial angles lingual
3 years	Class I	Slight crowding rotation of a | a mesial angles lingual
3 years	Class I	Slight protrusion. Probably a mouth-breather
4 years	Class I	Crowded lower incisors. Narrow upper arch
4 years	Class I	Protrusion. Thumb-sucking
5 years	Class I	Crowded lower incisors b | lingual to c | a | a rotation mesial angles lingual
5 years	Class I	Crowded lower incisors rotation a | a mesial angles lingual
5 years	Class I	Supernumerary lateral in lingual occlusion
5 years	Class I	b a | a b may be a little lingual to c | c
		121 Children were examined. 10.7% with malocclusion

TABLE XIX

MEIDLINGER KRIEGSSPITAL AMERIK KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA) MALOCCLUSION

AGE	CLASS	
2 yrs. 10 mths.	Class I	Slight crowding of upper incisors
3 years	Class I	Slight crowding of lower incisors a | a quite loose. No recession or hyperaemia a | a rotated mesial angles lingual
3 yrs. 6 mths.	Class I	Big overlap of incisors
3 yrs. 7 mths.	Class I	i | i rotated mesial angles lingual
3 yrs. 8½ mths.	Class I	Crowding of upper incisors a | a a little in labial occlusion
4 yrs. 6 mths.	Class I	b | b in slight lingual occlusion to c | c arch a little narrow between c | c (c b a | a b c / a a | a) lost.
4 yrs. 6 mths.	Class I	Slight crowding of c b | but spacing taking place
4 yrs. 6 mths.	Class I	Slight open bite in incisal region from biting fingers. It may also account for separation of a | a
4 yrs. 6 mths.	Class I	Slight crowding of lower incisors (c | c / c |) lost (a | a / a | a) quite loose
4 yrs. 9 mths.	Class II Div. I	Slight Malocclusion the result of premature loss of deciduous teeth
3 yrs. 10 mths.	Class I	Drifting, and contraction of upper arch between c | c and space for | c (c | a b / | c) lost
4½ years	Class I	Drifting into space for | c (c | c / c |) lost
4¾ years	Class I	Tilting of teeth lingually & mesially towards space for (a | a / b a | a b) (a | a / b a | a b) lost
5 years	Class III	Complicated by mesial drifting of e | e. c | b c completely labial to upper incisors c | b c very elongated cervical caries d b a | a d lost

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TABLE XIX—CONT'D.

AGE	CLASS	
$5\frac{1}{4}$ years	Class III	Slight contraction between $\overline{b \vert b}$ due to loss of $\overline{a \vert a}$. Broader portion of lower arch is occluding with narrower portion of upper arch. Left side lingual occlusion of $\underline{\vert d\ e}$ $\frac{c\ b\ a \vert a\ b\ c}{a \vert a\ e}$ lost
$5\frac{3}{4}$ years	Class I	Greater mesial drifting of $\underline{b \vert b}$ than $\overline{b \vert b}$. Disto buccal cusps of $\underline{b \vert b}$ in buccal grooves of $\overline{b \vert b}$. Elongation of $\overline{c\ b \vert c}$ Cervical caries $\frac{e\ d\ c\ b\ a \vert a\ b\ c\ d\ e}{e\ d\quad a \vert a\ b\quad d\ e}$ lost
6 years	Class I	Mesial drifting of $\overline{e \vert e}$ $\frac{c\ a \vert a}{d\ b \vert b\ c\ d}$ lost.
6 years	Class I or III	Will probably develop into Class III. Mesial drifting of $\underline{e \vert e}$ and distal drifting $\underline{c \vert c}$. $\frac{d\ b\ a \vert a\ b\ d}{d\quad a \vert a\quad d}$ lost
$5\frac{1}{4}$ yrs.	Class I	Slight crowding of lower incisors $\underline{\vert a}$ in lingual occlusion biting inside lower incisors $\overline{c\ b\ a \vert a\ b\ c}$ very loose and gums hyperaemic
$5\frac{1}{4}$ yrs.	Class I	$\overline{b \vert}$ in lingual occlusion $\overline{a \vert}$ in labial occlusion. Arch contracted between $\underline{c \vert c}$
$5\frac{1}{4}$ yrs.	Class I	Crowding of lower incisors $\overline{\vert a}$ in labial occlusion contraction between $\frac{c \vert c}{c \vert c}$ $\underline{a \vert a}$ in labial occlusion
$5\frac{1}{2}$ yrs.	Class I	Lingual occlusion of $\underline{a \vert a}$
$5\frac{3}{4}$ yrs.	Class I	Open bite in incisal region $\frac{a \vert a\ c}{c \vert c}$ lost $\frac{c \vert b}{a \vert a}$ elongated and loose.
$5\frac{3}{4}$ yrs.	Class III?	Possibly wrong bite cervical caries $\frac{c \vert c}{\vert b}$ lost
7 years	Class III	Slight crowding of lower and upper incisors and mesial relation of lower molars & jaw. Lingual occlusion of $\underline{c\ b \vert}$ edge to edge of $\underline{\vert b\ c}$
7 yrs. 5 mths	Class I	Open bite between $\frac{b \vert b}{b \vert b}$ $\frac{a \vert a}{a \vert}$ missing, $\overline{\vert i}$ erupting
134 children were examined		13.4% with malocclusion, exclusive of cases due to premature loss
$6\frac{1}{4}$ years	Apparent	Class III relation $\frac{d\ c\ b \vert b\ c}{e\ c \vert e}$ so loose that they could be lifted out. A good deal of roots not absorbed except $\overline{e \vert e}$ no sign of permanent teeth $\frac{a \vert a}{d\ b\ a \vert a\ b\ c\ d}$ lost
$6\frac{1}{4}$ years	Class III	Lower molars in mesial relation $\frac{b\ a \vert a\ b}{e\ d\ c\ b \vert b\ c\ d\ e}$ lost
$6\frac{1}{2}$ years	Class I	Slight crowding of lower incisors. Mesial drifting of $\overline{e \vert}$ & distal drifting of $\overline{c \vert}$ $\frac{a \vert a\ b}{d \vert d}$ lost
$6\frac{1}{2}$ years	Class I	Mesial drifting of $\overline{b \vert b}$ into spaces for $\underline{e \text{ or } d \vert e \text{ or } d}$. Cervical caries $\underline{d \vert d}$ lost
$6\frac{1}{2}$ years	Class I	Mesial drifting of $\frac{e \vert e}{e \vert e\ d}$ $\underline{\vert e}$ in lingual occlusion $\frac{d\ b\ a \vert a\ b\ d}{d\ c\ b\ a \vert a\ b\ c}$ lost
$6\frac{3}{4}$ years	Class I	Contraction between $\underline{c \vert c}$ $\underline{\vert b\ c}$ in lingual occlusion $\frac{\vert a}{a \vert a}$ lost
8 years	Class I	Mesial drifting and tilting of $\overline{b \vert b}$ and drifting of $\underline{\vert e}$ mesially $\frac{c\ a \vert a\ c\ d}{e\ d\ c \vert c\ d\ e}$ lost

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APPENDIX III

Diet used in feeding puppies in experiments carried out by Mrs. Mellanby and called Diet "A."

Diet A
Separated milk 175-250 c.c. per day.
White bread, ad. lib.
Yeast (water soluble "B" Vitamine) 5-10 gr. per day.
Orange juice (antiscorbutic vitamine) 255 c.c. per day.
Sodium chloride, 1 gr. per day.
In most cases lean meat, 5-5 gr. per day.

Of 35 puppies fed on very deficient fat-soluble "A" diet (Diet A), 29 showed very irregular teeth.

Of 5 puppies fed on Diet A × 10 c.c. linseed oil and extra separated milk, 4 had slightly irregular teeth and 1 regular.

Of 19 puppies fed on Diet A × 5 to 7.5 c.c. of codliver oil per diem, 4 had slightly irregular teeth and 15 were regular.

i.e., 89 per cent irregular on deficient diet.
20 per cent slightly irregular on efficient diet.

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DISCUSSION

Dr. A. Leroy Johnson, Boston, Mass.—The American Society is very fortunate to hear the report of an investigation of the nature and significance of that which Mr. Friel has just presented. It has been my privilege to study the charts with Mr. Friel, and, although he will tell you that literally the result of his investigation is negative, I thoroughly believe the data which he secured and exhibits here constitutes a foundation for a study of developmental conditions of dental structures we are sadly in need of. Mr. Friel made the trip to Vienna at his own expense, inspired by the desire to know something of the etiology of maxillary deformities.

I wish, when he is closing the discussion, that Mr. Friel would tell the society about the social and economic conditions under which the profession is living and laboring today.

Dr. Milo Hellman, New York City (discussing Dr. Friel's paper).—I wish to thank Dr. Friel for giving us the results of his interesting investigation, and congratulate him on the success of his efforts in such a worthy cause. There are few orthodontists or dentists who would sacrifice the time, the energy and the money that are involved in conducting an investigation of this sort. I highly appreciate what he has done, and I wish to express my thanks to him for it.

I want to emphasize his remarks by adding similar facts bearing on the shedding of teeth as a factor in the etiology of malocclusion. There is found to be prevalent in cases

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where nutrition or care in general is involved an accelerated rate in this process. Last year I read a paper before this society and reported an investigation of 1250 children among the poor of New York. Manifestations were brought out (which will be elaborated later on), namely, that owing to economic conditions their stature and weight were low, and that owing to a lack of dental care and to improper food their teeth decayed extensively and the shedding process of the deciduous teeth was hastened. And coincident with these manifestations there is malocclusion of the permanent teeth. But this does not appear in such high percentage of cases as one would expect if malocclusion of the teeth were due to those conditions alone.

On the other hand, investigations of children of the wealthy show a considerably high average in stature and weight, and a slowing up in the process of shedding of the deciduous teeth. *But* there is an increase in the percentage of cases of malocclusion.

The wealthy it must be stated depend to a very large degree upon the modern pediatrist for the rearing of their children. The modern pediatrist is able, by his skill and knowledge in artificial feeding to increase the size and weight of children under his care. But as shown by McCollum in his experiment, tallness has nothing to do with healthfulness. Tall animals are not always healthy animals and healthy animals are not always tall animals. Thus we see, for example, that the tall children shed their teeth at a later period than the small ones. But they also show a higher percentage of malocclusion.

By Melanby's experiments, we learn that by means of certain food deficiencies the animal retained the deciduous teeth for such long periods as to bring about the eruption of the permanent series in malocclusion. We may therefore be safe in saying that not the lack of food, but rather the presence of it in improper quality is conducive to malocclusion of the teeth.

Mr. Sheldon Friel, Dublin, Ireland (closing).—I thank you very much for your invitation to be present at this meeting and for the way you have received my paper.

The state of the professional classes in Vienna at present is very dreadful. During the War the middle classes fared much better than the working classes; the latter could not afford to buy more food than the rations and sometimes not even these. Since the Revolution the working man is on top and his wages have gone up a great deal in proportion to the enormous rise in the cost of living, whereas, the income of the professional man has increased very little.

The university professors and men of that type are literally starving. The best paid professors get an equivalent of less than $100.00 a year and the majority get a quarter of that amount, or considerably less.

I learned a little about the dentists and found that a great number of them are in great need. The majority of their patients belong to the middle class and as these are the people that are suffering most at present, it is obvious that the fees they receive from them are relatively small.

When I returned to Ireland, I suggested at a Dental Meeting in Dublin, that a small fund should be raised from among Irish dentists to be sent to Vienna dentists for Christmas. The following is one of the letters that I received from a Vienna dentist, who received help from this fund.

The fund was sent to the Friends' Relief Mission in Vienna for distribution.

"Before I express my thanks to you for the help given to me through the Friends' Relief Mission, may I, as briefly as possible relate my experiences and explain my position to you, for I wish not only to thank you but also to make it clear why I feel justified in accepting your generous assistance.

"After finishing my medical studies, I took a course of dentistry at our university in Vienna and took my dentist's degree at the Northwestern University Dental School in Chicago, where Black was then lecturing.

"After years of hard work I established at last an excellent practice among the well-to-do people in Vienna. Then the war broke out and I volunteered at once as army doctor, but at the end of a week I was taken prisoner by the Russians and sent to Siberia where I spent six years. I was in various camps in eastern and western Siberia, chiefly in

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small cities; I practiced Medicine during various epidemics. Then I was fortunate enough to have quite a good dentist's equipment placed at my disposal by the Red Cross Society, so that I was enabled to practice my profession among the prisoners during the last years of my captivity. For the first two or three years, except for the fact that we were prisoners, we did not fare badly. However, upon the outbreak of internal unrest in Russia and with the increasing needs of the population our standard of living gradually sank lower and lower until we practically lived as beggars. Then, when the Bolshevists came, the camp was disbanded and we all had to earn a living as best we could.

My dental equipment was illegally requisitioned by the military authorities. Two women dentists had formerly practiced in the city. (It is interesting to note that in the years I spent in Siberia I came into contact with women colleagues only.) One of the two succeeded in escaping, the other remained behind. The consulting rooms, where the latter had practiced most successfully, were seized by the State and turned into a public clinic, where everybody had a right to free treatment. We were both placed there as dentists by the Board of Health so that she, at least, had the advantage of being able to remain in her own house and work in her own rooms. For a few months we were put into the food class of the lowest rank, the monthly ration for which was 4 lbs. of meat, 22 lbs of black flour and some salt. We also received a monthly salary of 1,800 Roubles—this did not even pay for the mending of a pair of boots. Later on we were classed with the Red Guards but our salary was still too small to live on. However, it was so with the whole population, and the educated people were systematically ruined. We just managed to live by exchanging the last of our possessions for food with the peasants. But that was gradually stopped, as no one was allowed to leave the town and place to which he was assigned. Finally, the hour of freedom struck for me. At the beginning of October I was declared seriously "invalided" and assigned to a proletariat transport. (The slightly invalided and healthy were the last to be allowed to return to their homes.) After a journey of eight weeks full of excitement and difficulties (by way of Moscow and Riga), I finally reached home (December, 1920), literally in rags. However, I had the great joy of finding my wife and two children alive and well—I had no news of them for a year and a half. During my absence my wife had rented my rooms, and so had at least been able to keep our flat—a great piece of good luck, as there are no flats to be had now either in Vienna or in the provinces. The help my family received from the State was very small, so that in the course of years the little property that I owned was exhausted; jewels and other things not absolutely indispensable were sold. I had become tuberculous on the journey home and after my return I was unable to work for the first few weeks. The general conditions in Vienna are as sad as they can well be and perhaps, dear Sirs, it may be of interest to you if I give you some idea of the difficulties against which your Austrian colleagues have to contend.

"During the war and after, the distribution of food was undertaken by the State but the rations of each individual were so small, that it was impossible to live on them alone. I am not exaggerating when I say (I heard this from many medical men) that large numbers of people literally died from hunger. The more difficult the question of food became, the higher the prices owing to the large amount of profiteering carried on. To avoid starvation everybody used every means he had at his disposal. Because of profiteering, prices rose enormously and remained very high and even continued so when later the food products were only partially or had entirely ceased to be rationed by the State. The same is true of dress materials, boots, and shoes, underwear; so the "Mittelstand" which had suffered most in the general social changes was obliged to sacrifice its all in order to keep alive.

"Now the private dentists are dependent upon the well-to-do, educated middle-class. These people, who have risen by speculation and profiteering and who make a great display of wealth have not yet reached the stage of refinement when they value a proper care of their teeth. They flock to inferior dentists who understand how to flatter them. The working class, too, which is much better off in every way since the war is not yet educated up to good dentistry, but is content with the services they get from their "Krankenkassa" dentists.

"Another reason for the difficulties of our position is that almost all our dental instruments and other necessities come from foreign countries. Because of the very low

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value of our money, we have to pay unheard-of prices for them; a "Black" drill, for example, costs 600 Kronen, a sum on which in pre-war times, a small family could have lived comfortably for a month. Many of our materials cost 40 to 50 times as much again, gold 100 times. The wages of the assistants and mechanics are 20 times as high as formerly. Naturally the dentists were obliged to raise their fees, but they could not make them more than 10 times what they were formerly, as no one would have been able to pay them. I have talked to a number of my colleagues whose integrity is above question and they all assure me that with the greatest industry they can only earn enough to furnish themselves and their families with the bare necessaries of life.

"Besides this, the political revolution has brought a most unfavorable conclusion to the fight that we dentists have been waging for many years with the "Zahn-Techniker," i.e., dentists who have not yet taken their dental degree, and who were originally only allowed to do the mechanical part of the work (such as making false teeth, plates, etc.). It was suddenly decided that no distinction should be made between dentists who have taken their degrees and those who have not, with the single exception that the former still have the sole right of extracting teeth, but that will undoubtedly be granted to the mechanics in the near future. Another circumstance, much to be regretted is that because of the low rate of exchange we are no longer able to subscribe to foreign Dental Magazines, and that it has become quite impossible for our young colleagues to study abroad. This, of course, interrupts the exchange of ideas so necessary in our profession.

"A young dentist just about to start a practice for himself needs more than 200,000 Kronen for the barest necessities (chair, motor, instruments, materials, etc.); for this sum in pre war times he could have bought a large estate.

"Now, to return to my own case, I need not tell you how injurious to a dentist's practice an absence of six and a half years must inevitably be. I hope, however, that in the course of time I shall succeed in building up my practice again, so that I can, at least, support my family, but I have to begin at the beginning again, and this time quite without resources. You can, therefore, realize what a tremendous help you are giving me and how indescribably great my relief is from the most pressing anxiety about the immediate future. Through your generosity I am able to purchase a supply of the most necessary materials and to pay my most urgent expeness, but I am grateful for far more than the material help. It came at a psychological moment when I was deeply depressed. When brutal egotism is flourishing, when one feels that everything fine and noble in the world is going to pieces, one doubly appreciates and values sympathy and friendly assistance. At such a time one's courage and optimism are revived.

"Please accept my most heartfelt thanks and be assured that I shall make every effort when times are better to transfer to others in need the debt I owe to you."

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AN EFFICIENT LINGUAL LOCK*

By Ernest N. Bach, A.B., D.D.S., Toledo, Ohio

In presenting this lingual lock to the members of the specialty, I wish to state, while it may not prove satisfactory to some hands, it has proved satisfactory with the author, and other orthodontists who have used it. Although not perfect, I believe it to be of a correct principle.

While considering some sort of attachment for a lingual removable wire, these points were kept in mind; something which would be efficient; simple; easy to make; easy to remove and replace; occupy the least lingual space, and one which would rotate molars and yet maintain the rigidity of the attachment.

Lock No. 1 fulfills these requirements very well, and is used on molars requiring rotation. Lock No. 2 is used on molars not requiring rotation, and is much more stable than the No. 1 lock.

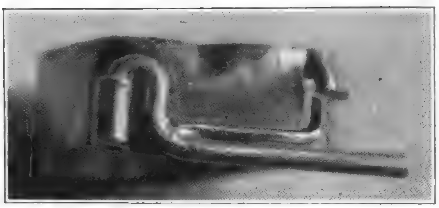

Fig. 1.

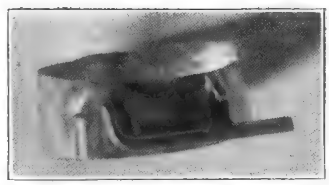

Fig. 2.

Fig. 1.—Lock No. 1. Shows the lock used on molars requiring rotation. The locking spring wire lying close to the arch wire and bent occlusally to engage the "catch" on the upper right occlusal edge of the band

Fig. 2.—Lock No. 2. Shows the lock used on molars not requiring rotation, and also used in combination with the No. 1 lock, where one molar may require rotation and the other not. The "catch" is the same as on the first lock but the lug soldered to the arch wire takes the place of the locking spring wire.

The materials used in these locks are described here: Band Material, .20″ × .005″ Ney-Oro Band Material No. 3. Lingual wire, .037″ (19 gauge) Ney-Oro Elastic wire. Locking spring wire, .023″ (23 gauge or larger if desired), Aderer No. 4 wire. Round tubes .060″ × .037″ × 3/32 Blue Island Co. (noble metal). The "catch," .037″ wire Aderer No. 4.

Whatever kind of band is used, the lingual surface must be free from all attachments that would interfere with the lock.

The 19-gauge Ney-Oro elastic wire allows the use of the Lourie wire stretching pliers if desired, although iridioplatinum or other noble metal wire may be used for the stabilizing wire.

The ends of the arch are bent, forming the pins, (Fig. 3) or the pins may be soldered on as in Fig. 10, and the solder trimmer, Blue Island Co. (Fig.

*Clinic given before the American Society of Orthodontists and the Dewey Alumni Society, Atlantic City, April 26-30, 1921.

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13,*a*) used to remove the excess solder, by slipping the trimmer over the pin and giving it a rotatory movement, cuts off the excess solder leaving a square shouldered joint to rest against the top of the tube.

CONSTRUCTION

The appliances are made indirectly. Assuming we have the bands on the model, on the molar teeth, the tubes are soldered on the distolingual surface of the band, midway between the occlusal and gingival edges of the band. This position reduces the lingual interference (Fig. 3, *a*).

The "catch" is made by filing a square notch in the end of a 19-gauge wire deep enough to receive the 23-gauge locking spring wire. The "catch" is soldered near the occlusal edge of the band in the region of the mesiolingual cusp, with the notched side next the band (Fig. 3, *b*) and cut off as in Fig. 3, *c*. By bending the stabilizing wire to form the pins (Fig. 3, *c*) the arch can then be adapted to the model as desired. The locking spring wire is soldered to the arch wire at the angle formed by the horizontal and vertical portions of the arch, extending anteriorly, lying close to the arch wire, and bent occlusally

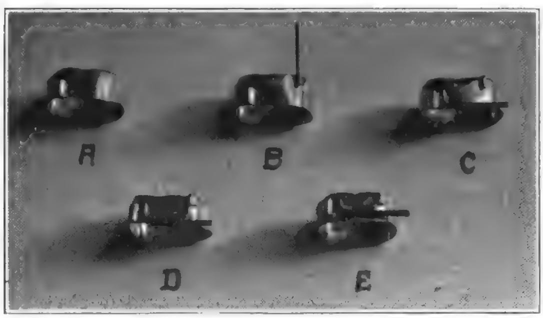

Fig. 3.—Shows the progressive steps in making the first lock.

at the "catch," and then at right angles to engage the same (Fig. 3, *d*). Fig. 3, *e*, shows the finished lock, as shown in the No. 1 lock. A large locking spring wire can be used, and is desirable, in place of the 23-gauge wire. The free end is filed thin enough to engage the "catch." A 21-on 20-gauge wire is a desirable size, as stresses of mastication have a tendency to dislodge the lighter wire.

With the locking spring lying close to the stabilizing wire, forces of mastication very seldom send the locking wire beyond its tension point, as it strikes the stabilizing wire and the stress is taken up by the larger wire, and the locking spring wire usually returns to normal position.

With the exception of the locking spring wire, the No. 2 lock is made in exactly the same manner as the No. 1 lock. In place of the locking wire the end of the Aderer No. 4 wire 20-gauge, is filed flat on both sides just thin enough to engage the "catch," and this is bent at right angles just far enough from the end, to fit between the stabilizing arch and the "catch." This leaves the round end of the wire free to hold while soldering to the stabilizing wire, at the same time having the flat engage the "catch" to give

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an accurate adaptation to the lock. The surplus wire is cut off, the soldered joint polished, leaving the lock shown in No. 2.

This attachment can be used buccally or lingually as shown in Fig. 9.

It has proved very satisfactory to use a combination of the two locks, especially on the mandibular molars or the lingual, that is, using the No. 1 lock on the molar band, the No. 2 lock on the other. It is easier on the mandibular molars to remove the No. 2 lock after removing the lock with the spring wire. However, on the maxillary molars their lingual incline does not afford protection to the locking wires, and the No. 2 lock is the most desirable unless the molars require rotation.

Fig. 4, *a,* shows the No. 1 lock in which the pin has been soldered to the arch wire; *b,* differs only in the method of bending the locking spring wire to avoid stresses of mastication; *c,* shows still another form of lock wire attachment. In this attachment, the "catch" is made as described, but soldered midway occlusogingivally on the band, with the occlusal end ground flat for the stabilizing wire to rest upon, it having been bent as shown in the figure. The locking wire, 23-gauge, is soldered to the stabilizing wire and bent gingivally and at right angles to engage the "catch." The stabilizing wire protects the locking wire from mastication stresses in this form of attachment. Fig. 4, *d* is the

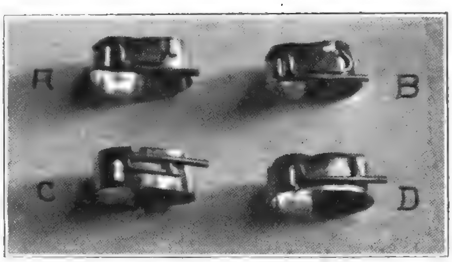

Fig. 4.—Shows various ways in arranging the locking spring wire to avoid stresses during mastication. "D" shows the second form of lock shown before.

same as the No. 2 lock. In case the No. 2 lock has been used, and it is desired to rotate the molar to which it is attached, the lug portion which engages the "catch" can be unsoldered, and a locking spring wire soldered in its place, and adjusted, as the same "catch" is used in all cases thus simplifying and making the parts interchangeable.

These locks require the least possible space in the mouth, as they project lingually only the thickness of the 19-gauge wire, the tubes being inclined toward the embrasure.

When replacing the arch, start the pin portion in the tubes, pressing the pins to place first, then snap the locking wires. Care must be taken to see that there is no buccal or lingual tension in the locking wires, as a rotation of the molars is apt to result which will be described later. The correct placing of the tubes and bending of the stabilizing wire will prevent the lock from impinging on the gums, of course depending upon the case, as a great many times it is not advisable to use a lingual removable arch.

To remove the No. 2 lock, the arch wire is caught with a pair of pliers just anterior to the lug, and pressed gingivally until the lug clears the

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"catch," at the same time springing lingually and removing. One side is removed at a time. To replace, one side is replaced at a time, being sure that the pins are in the tubes as far as possible before snapping the lug to place.

In both attachments, the pin and tube fitting accurately, prevents all movements except that of rotation. This is prevented in the No. 1 lock by the locking spring wire, and in the No. 2 lock by the tension of the stabilizing wire.

ROTATION OF MOLARS

The No. 1 lock provides an arrangement for the rotation of molars. It is not always desirable to rotate molars using the same axis of rotation. Thus

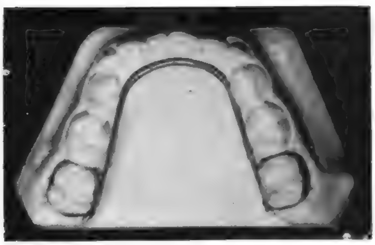

Fig. 5.—Showing a practical case with the removable lingual arch held in place by the No. 1 lock.

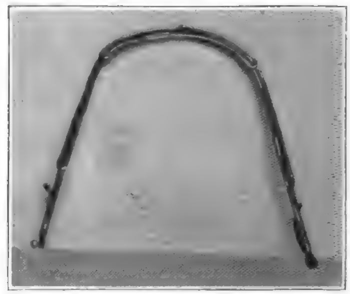

Fig. 6.—Shows the lingual arch used in the case in Fig. 5. The arch wire is shown inverted to show the springs which are located gingivally when in position in the mouth.

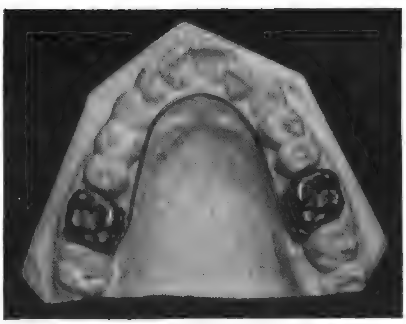

Fig. 7.—A practical case showing the position of molars, requiring rotation. The molars are made of amalgam and mechanically arranged to show the effect of spring movement in rotating them. This shows the molars before rotation.

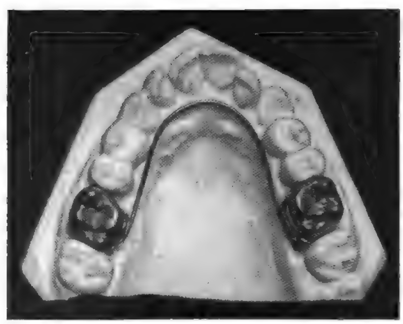

Fig. 8.—Shows the effect of the adjustment of the locking spring wires upon the rotation of the molars.

we may find the mesiobuccal cusp of the maxillary first molar may be lingually inclined, and the distolingual cusp in nearly its normal relation to the mandibular molar. Rotated molars of this class indicate that the mesiobuccal cusp be directed buccally, with the distolingual cusp used as a pivoting point. Another type of rotated molar is the one which requires the mesiobuccal cusp to be directed buccally and the distolingual cusp lingually, the whole tooth being rotated using the center of the crown as the axis of rotation.

Fig. 7 illustrates both of the types. On the reader's left is shown the

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type of molar to be rotated, using the center of the crown as the verticle axis of rotation; while on the right is shown the type of rotated molar using the distolingual cusp as the center of rotation.

To rotate the molar on the left, the arch wire is bent so that the pin lies anterior to the tube about the distance of its own thickness and approximately the same distance lingually, while a buccal "kick" of about 1 mm. is put into the locking spring wire. This side is locked to place first. Fig. 8, left side, shows the effect of the adjustment on the molar.

To rotate the molar on the right, the tube is used as the center of rotation, and the pin and tube relation not disturbed, only a buccal "kick" of about 1 mm. being put into the locking spring wire, the pin lying in the tube passively. The molar on the right in Fig. 7 shows the effect of the adjustment.

It is better to make three or four adjustments in rotating the molars, than trying to get the required rotation in one adjustment, as less danger would be encountered pathologically. It is also advisable to rotate one molar at a time, thus making the passive end of the arch, stationary anchorage, by ligating to two or more teeth of that side.

If it is desired to tip molars buccally or lingually, a torsional strain is

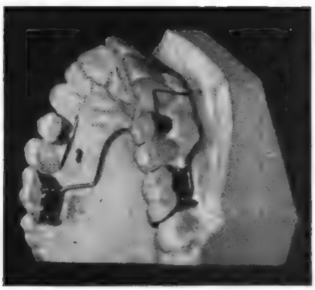

Fig. 9.—A model to show the buccal and lingual use of the attachment. The buccal attachment is the same as shown on the lingual, but not distinctly shown.

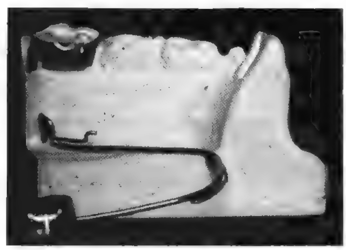

Fig. 10.—Shows half of a model to demonstrate the rigidity of the lock. The arch wire has been removed to show the part of the lock more clearly.

put into the arch wire by giving it the desired twist, so that the pins lie in the position they are to take eventually, and then forced into the tubes, and locked.

Fig. 5 shows a practical case, with the locks and stabilizing arch in place, together with the lingual springs, which lie to the gingival of the stabilizing wire for protection. The cut also shows the relative space taken up by the locks.

Fig. 6 shows the stabilizing wire after removal, and the Mershon auxiliary springs used for lateral expansion, with the same principle applied to the anterior springs. These anterior springs are soldered to the stabilizing arch at the median line, extending distally to include the lateral incisors, and recurved to the median line. These springs give a range of movement at any point, and tend to prevent separation of the anterior teeth which is apt to result when a long lateral spring is used (with distal attachment). Care must be taken not to put too much pressure on these springs as they have a tendency to crawl up the lingual inclines of the incisors, unless pre-

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vented by a spur on two or more bands, which otherwise would cause a tipping of the molar teeth. In distoclusion cases, with overbite, this has the same effect as using a labial arch which has been bent gingivally and sprung occlusally and ligated to the anterior teeth.

Fig. 9 is a case showing the use of the No. 2 lock in connection with the molar stabilizing arch, and also showing its use bucally in connection with a high labial arch, although the plain round tube or the Barnes' tube may be more practical to use here.

Fig. 10 is a clinic model to demonstrate the rigidity of the lock, but in the figure the arch wire is removed to show the construction of the lock. In this

Fig. 11.—Shows a modeling compound impression of Fig. 5, after the lingual arch was removed, with duplicate round tubes in the impression made by those on the model. The hook shape wires are soldered to the tubes to hold them to the plaster after pouring.

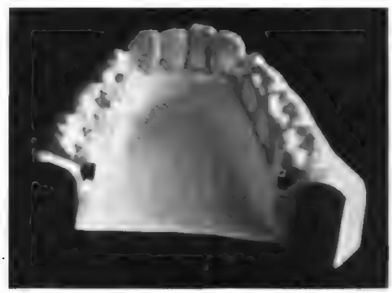

Fig. 12.—A model showing the position of the tubes after pouring the impression shown in Fig. 11. This gives a working model upon which is made the new appliance without removing the bands from the teeth.

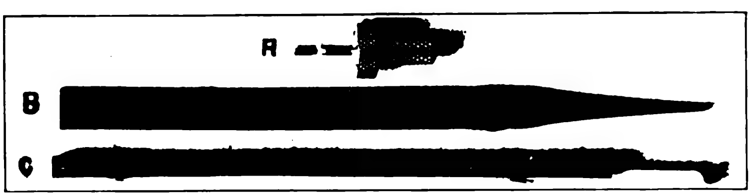

Fig. 13.—Shows the file, solder trimmer, and steel wire used in making the locks.

case the pin was soldered to the arch wire instead of bending the end of the arch wire to form the pin. The bending of the stabilizing (arch) wire to form the pins, makes one less soldered joint and consequently strengthens the stabilizing wire.

MAKING A NEW ARCH WIRE

To make a new arch wire without removing the bands from the teeth it is desired to have only the correct relation of the tubes and the lingual surfaces of the teeth, but not necessarily the bands. This method is not new, but quite convenient in this case. A plaster or compound impression is taken of the

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teeth, etc., with the appliances removed. This leaves the impression of the tubes, teeth, etc., in the impression material. Like tubes, to which German silver wire extensions have been soldered (Fig. 11), are placed in the impressions made by the tube on the bands, and waxed to place. When the impression is poured these wire extensions being anchored in the plaster hold these tubes rigidly in place (Fig. 12). From this point on the new arch is made as before.

To shorten the operation of making a new lingual arch wire, the old wire is cut off at both ends about ¾″ from the pins, and the pins placed into the tubes of the model (Fig. 12), and the new portion of the arch adapted and formed where desired, soldering the ends of the old arch and the new with 22 karat solder. This operation gives a new arch wire with the minimum of time and materials, the locking portions not being disturbed.

Fig. 13, *A*, shows a solder trimmer used to remove the excess solder from the joints where the pins are soldered to the arch wire, but is not needed when the pins are formed by the continuation of the arch wire. ***B*** is a jeweler's file used because of the fine cut and definite square edge for making the "catch." *C* is a steel wire which has been driven into the end of an orange-wood stick, and heated and bent as shown. This is used to hold the tubes while soldering them to the bands, as solder sticks to steel with difficulty. Steel's antiflux may help in this detail also.

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THE PRINCIPLES OF THE JACKSON SYSTEM OF ORTHODONTIA*

By Dr. V. H. Jackson, New York City

Showing:

1. The divisions of the dental arch as he describes them, are defined by the sutures of the maxillæ.

2. The plan of the regulating appliances recommended, consists of a rather large base-wire as the foundation of the appliance, there being three standardized forms. Other parts of the appliance are as follows:

3. Partial-clasps, wire-clasps and spring-clasps of suitable form to anchor regulating appliances to the teeth used for anchorage.

4. Finger-springs of various forms on appliances, for moving the teeth.

5. Semicircular-springs, labial and lingual, with loops for moving incisors and canines.

6. Spurs as used, extending onto the crown of the anchorage teeth, for supporting the appliance to prevent it from resting on the gum.

7. Lugs on collars cemented to anchorage teeth to support the free end of clasps used for anchoring a regulating appliance in moving the teeth.

8. The plan of a "locking device" having wire-clasps extending from the appliance with the free end held by a lug on a collar cemented to the anchorage teeth.

9. Metals recommended for making appliances. Precious metals for all parts, as collars, base-wires, springs and partial clasps. Silver nickel for base-wires and springs. German silver for base-wires. Phospho-bronze for base-wires and especially for springs. Spring-bronze plate for partial-clasps, etc.

10. *Equalizing* the dental arches with equalizing bands in cases of posterior-occlusion, anterior-occlusion and unilateral occlusion with equalizing posts.

11. *Working Model,* showing what changes take place in the mandible in equalizing the dental arches in cases of posterior-occlusion, prognathism, excessive overbite, lack of anterior-occlusion, etc.

12. *Record Card* for keeping permanent record of changes in regulating appliances for adding force in moving the teeth. In effect reducing orthodontia to an exact science.

13. *Standardizing* regulating appliances used for different purposes in moving the teeth.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27, 1921.

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Under Editorial Supervision of
M. N. Federspiel, D.D.S., M.D., F.A.C.S., Milwaukee.—Vilray P. Blair, M.D., F.A.C.S., St. Louis, Mo.—William Carr, A.M., M.D., D.D.S., New York.—Joseph D. Eby, D.D.S., New York. — Leroy M. S. Miner, M.D., D.M.D., Boston.— Wm. L. Shearer, M.D., D.D.S., Omaha.—Fredrick F. Molt, D.D.S., Chicago.— Robert H. Ivy, M.D., D.D.S., Philadelphia

A PRACTICAL METHOD OF WIRING FRACTURES OF THE MANDIBLE OR MAXILLA*

By James Walter Ford, D.D.S., St. Louis, Mo.

AT a recent medical society meeting a statement was made that the method of treating fractures of the mandible or maxilla by wiring is unsatisfactory. Evidently the doctor was speaking from his own experience along that line which surely must not have been very extensive. It is a fact that there are some fractures of the edentulous mandible or maxilla which cannot be treated by wiring, as the term is herein used; yet in the majority of other cases it is the most efficient method of treatment.

Wiring is the ideal method of treating fractures of the mandible or maxilla in the hands of the operator who has a thorough knowledge of normal and abnormal occlusion. It is a serious mistake for a dentist or a physician to treat fractures of the mandible or maxilla by any method if he knows little or nothing about occlusion.

There are several methods of treating fractures of the jaws, the least desirable of which is the use of the bandage. A bandage is tight when placed in position but soon loosens, thereby failing to hold the fractured parts in their proper positions for any considerable length of time. Fixation in proper relation is the objective in fracture treatment, and it is plainly evident that fixation is not secured by the use of any sort of bandage. If the convenience of the patient is to be given any consideration the bandage method is contraindicated. A loosely applied bandage, however, is used as an adjunct merely to indicate that the patient is under treatment for some condition about the head. One may readily understand that in a ward, a quarrelsome patient without such marking might get his mandible "busted," still more extensively.

The dental splint if properly made holds the fragments in their proper positions. Ready-made dental splints of any type are of little real value.

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*Read before the St. Louis Society of Dental Science, September meeting, 1922.

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Time and prosthetic skill are required to make an individual dental splint for each fracture case that presents itself, so the parts cannot be brought into normal positions and to rest immediately. It is desirable to obtain fixation of the parts in their normal positions as soon as possible after the fracture occurs; however many cases present themselves after the fracture has been neglected for a week or more. Infection is usually present in such cases, which condition slightly complicates the procedure.

It is evident that the first consideration in all fracture work is a digital examination followed by an intelligent radiographic examination, usually using x-ray plates. Another radiographic record is made after an attempt has been made to put the parts into their normal positions, to make certain that the attempt was successful.

The method of wiring fractures of the jaws described in this paper, which I believe is an improvement over former methods, is original so far as I know. It is merely the result of my being placed in a position where equipment was limited and where something constructive had to be done for dental fracture cases as they presented themselves.

Three kinds of wire are used—German silver, or Liberty metal, wire 17-

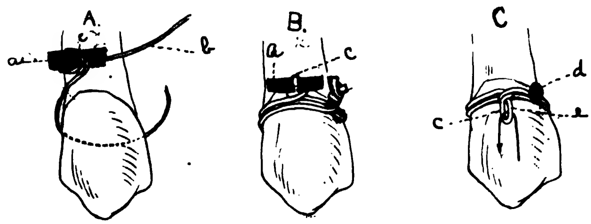

Fig. 1-A.—Showing the 24-gauge iron wires put through the interproximal spaces with one bent for the return passage through the other interproximal space. (*a*) German silver 17-gauge wire. (*b*) 24-gauge iron wide. (*c*) Eyelet in 24-gauge iron wire.

B.—The iron eyelet anchor wire is adapted to the neck of the tooth with the ends twisted.

C.—The anchor wire in position with eyelet "e" bent occlusally or incisally to receive the connecting wire. Seventeen-gauge wire has been removed from eyelet. (*d*) Knob of cement covering end of twisted wires.

gauge cut into pieces one-half inch in length; iron wire 24-gauge cut in pieces four inches long; and brass wire 24-gauge cut in two inch lengths. One of the short bits of 17-gauge wire is used to form an eyelet in the iron wire by bending the iron wire at the middle of its length upon the short wire. The long ends are crossed as closely as possible to the 17-gauge wire with these ends extending in opposite directions. With a pair of flat-nosed pliers the two iron wires are firmly grasped where they cross and close to the 17-gauge wire which is held in a vertical position with the left hand. The pair of pliers is given three-fourths of a complete turn either to the right or to the left, being guided by the uppermost wire. If the upper wire extends to the right, turn toward the right. If the upper wire extends toward the left, turn the pliers in that direction. When this movement has been completed, the opening at the point of the partially closed pliers is in a plane parallel with the length of the 17-gauge wire.

A number of these wires may be made up at one time. Very little time is consumed in making them. The ends are of sufficient length to be applied

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to any tooth that may be selected as an anchorage. The short German-silver 17-gauge wire is left in each eyelet until the iron wire has been completely adapted to the neck of the tooth and secured in proper position.

After a thorough study of the fracture or fractures from the radiographs and a complete examination of the occluding and incising surfaces and angles of the teeth, a decision is made as to the teeth upon which the wires should be placed. Different classes of malocclusion require a force or forces working from different directions. Therefore it is difficult to lay down a procedure for attaching the wires in a given number of cases of the same type of fracture, as the classes of malocclusion may have as many variations as there are cases, up to a considerable number.

It has been found that in a fair percentage of cases it is possible to attach the eyelet anchor wires to the premolars, i.e., one eyelet anchor wire on one of the premolars of the right maxilla and another eyelet wire on one of the premolars of the right mandible. On the left side the eyelet anchor wire

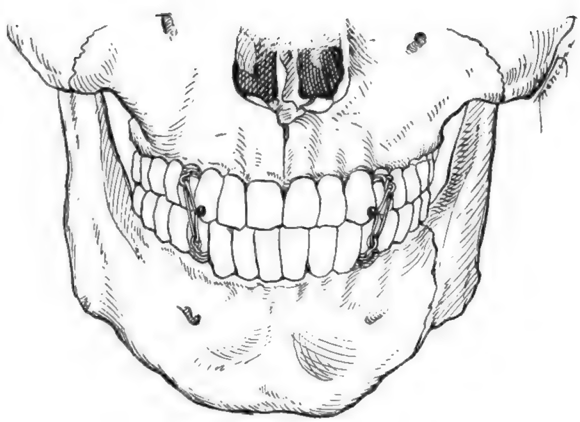

Fig. 2.—A complete appliance in position for treating a mandible fractured posterior to the mandibular third molar.

may be attached to one mandibular premolar* and a maxillary premolar, using in some cases the same teeth as on the opposite side. The canines must be used in some cases in which the premolars are missing or are crowned. In other mouths, the eyelet anchor wires are carried by the molars and occasionally by the central incisors. In some fractures it is necessary to use more than two eyelet anchor wires on each side. It is obvious that more anchorage is required to hold the jaws of some of the tobacco grinders in a desired position than to produce the same effect in the mouth of a delicate young lady who has not acquired the gum chewing habit.

After determining which teeth shall carry eyelet anchor wires, the next step is the final preparation of the wires before putting them in place. For this purpose, the cylindrical handle of a hand instrument is used. For some teeth, a mouth mirror handle is used to advantage. In other cases the round-nosed pliers is the proper instrument. The diameter of the handle used must

*The terms premolar and canine are used instead of bicuspid and cuspid to comply with the requirement of the journal. The author uses the terms bicuspid and cuspid.

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be the same as the mesio-distal diameter of the tooth which is to receive the wire, measuring through the middle third or the buccal or labial surface of the tooth. The two free ends of the iron eyelet anchor wire are held between finger and thumb of the left hand with the eyelet end farthest from the body. Then the instrument or mirror handle or even the round-nosed pliers is placed between these wires and moved toward the eyelet, exerting considerable pressure when the twist in the wires is reached so that this portion of the wire will be more readily adapted to the neck of the tooth. Each wire is treated as above. Then each of the wires should be in the shape of a long wire staple such as wiremen use to fasten lines of wire to wooden supports. The two lengths should be parallel and the same distance apart as the mesio-distal diameter of the middle third of the buccal or labial surface of the tooth to be wired.

In placing the eyelet anchor wires on the teeth it is well to always have consideration for the patient. If there is a fracture of the mandible, use good judgment and put the wires into place carefully on the maxilla before applying them to the mandible. If the maxilla has been fractured apply

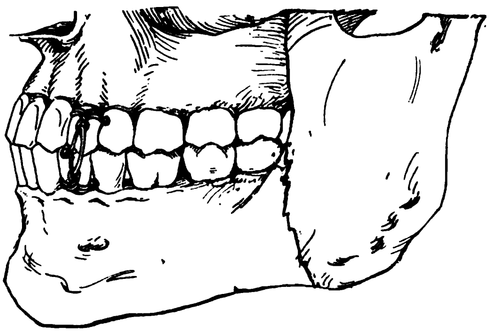

Fig. 3.—Lateral view of Fig. 2.

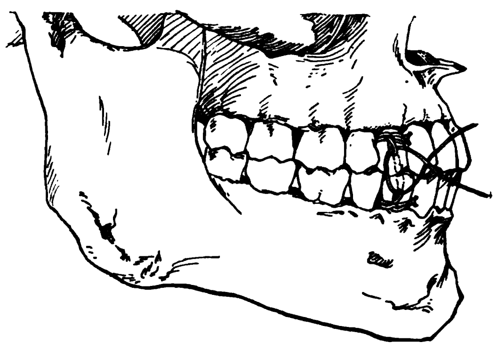

Fig. 4.—Lateral view of opposite side from the fracture. Dotted line represents ligature holding eyelet anchor wires in position while connecting wire is being applied.

all wires to the mandible first and to the opposite side of the maxilla before working in the region of the fracture. If this order is followed, the patient suffers less and will tolerate considerable pain if there is any, while the operator is placing the wires in the region of the fracture or fractures.

Each eyelet anchor wire is placed in position in the following manner: One of the ends is placed upon the gingival line of the crown of the tooth where it joins the mesio-buccal or mesio-labial line angle. The other end is placed upon the gingival line of the crown of the same tooth where it joins the disto-buccal or disto-labial line angle. By holding the anchor wire by the German-silver wire and exerting pressure thereupon while the other hand guides the two points, the eyelet wire is gently forced into its proper position, without the use of instruments or pliers. This German-silver wire should extend at right angles to the long axis of the tooth being wired if the technic is followed correctly. Now the ends of the iron wire are crossed but not twisted on the lingual surface of the tooth and the wire which passed

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through the mesial interproximal space is passed back toward the buccal or labial through the distal interproximal space. The wire which was passed to the lingual through the distal interproximal space is returned to the buccal or labial through the mesial interproximal space. One wire is passed through at a time. If the 17-gauge wire in the eyelet is held firmly while the return passages of the two wires are being brought about with pliers, the patient will suffer little inconvenience. Then two pairs of pliers and a beaver-tail burnisher are used to adapt this iron wire to the neck of the tooth. The eyelet with the 17-gauge wire should be directly over the center of the area designated as the gingival third of the buccal or labial surface of the tooth being wired.

The ends of the wire are drawn taut and crossed on the buccal or labial surface, occlusally or incisally from the eyelet and generally toward the distal. The wires are firmly grasped with a pair of flat-nosed pliers and the ends twisted gingivally and distally. This twist when completed should be

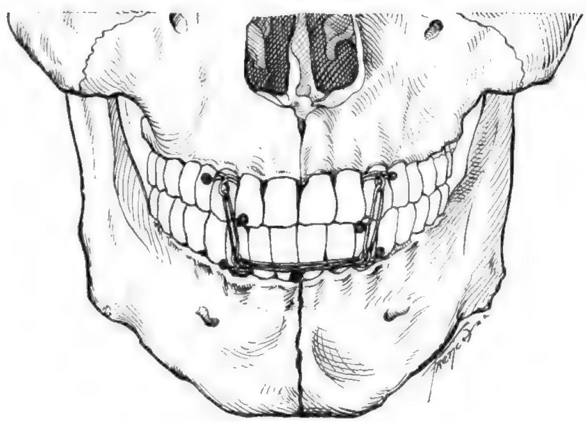

Fig. 5.—The wiring in position to treat a fracture of the mandible through the region of the symphysis.

cut off leaving it about one-fourth of an inch in length. With an amalgam plugger, the end of the twist remaining is bent distally and gingivally and covered with a small knob of quick setting crown and bridge cement to prevent irritating the buccal or labial mucosa and to enable the patient to keep the area clean.

The reader will understand from this article that in the first step both ends of the wire are passed through the interproximal spaces simultaneously; i.e., one end through the interproximal space distal to the tooth to be wired at the same time that the other end is being put through the interproximal space mesial to the tooth to be wired. In the second step, the wires are crossed, not twisted, and one wire at a time returned to the buccal or labial through the interproximal space on the opposite side of the tooth from which each was passed lingually.

The eyelet is bent toward the incisal or occlusal surface of the tooth supporting the wire and the 17-gauge wire is removed. The eyelet remains in the same position relative to the plane which is parallel with the long

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axis of the tooth from the buccal or labial to the lingual or when the first step in placing the wire was completed. If the technic has been followed carefully the eyelet anchor wire should be securely attached to the tooth.

After having placed the necessary number of anchor wires, the next consideration is connecting these eyelets. Dental ligature or floss is used to connect the anchor wires temporarily while the brass wires are being put into place. This ligature prevents any pressure against the gingiva.

A right angle bend is made in the 24-gauge brass wire about a third of the distance from one end. The long end is passed through the upper eyelet and then through the lower one. These ends are twisted as the operator watches the line of occlusion. Many times two lengths of the 24-gauge brass wire are required to properly connect two eyelets. Care should be exercised that these connecting wires are tight, yet not too tight. It is well to see the patient again after a few hours to see that the appliance is properly adjusted. Many times it is necessary to tighten the connecting wires after the first twenty-four hours, but these are the only wires which should need tightening. Should one of the connecting wires be twisted until it breaks, connect the eyelets with a ligature and replace the broken wire.

The twisted ends of the connecting wires are covered with a small amount of C & B quick setting cement making a knob-shaped mass. Then the ligatures are removed from the eyelets.

Each patient should be provided with a small mirror and a pair of small shears. Each patient should be shown the connecting wires and instructed how to clip them in the event of an attack of emesia. The nurse should be present when the instructions are given to the patient, if a hospital case. Several members of the family should know about the appliance if the patient is not a hospital case. Accidents do happen and generally with fatal results if none of those about knows the case.

Feeding the patient with a fractured jaw wired is not such a serious problem as might first be surmised. Hand the patient a glass of water and have him drink it. If the patient can get water into the mouth one is pretty safe in believing that there are many nourishing foods of which the patient may partake, such as: milk, soups, soft-boiled eggs, fruit juices, liquids from cooked vegetables, and in fact most liquid and semisolid forms of food.

A tooth or teeth should not be extracted to facilitate the feeding of the patient. It is very seldom that such a procedure is ever justifiable.

After the passage of from four to six weeks, depending upon the presence or absence of infection at the time the wires are put into position the connecting wires only should be removed. Other wires should be attached over the occlusal surface of each tooth supporting an eyelet away from the gingiva. The jaws may be freely opened if no ankylosis is present.

In case of ankylosis have the patient exert pressure upon the mandible and maxilla several times daily with the thumb and finger, tending to gently force the jaws farther apart. Sometimes a small wooden wedge of some soft wood is given the patient to gently force between the mandible and maxilla several times daily allowing it to remain in position for several minutes at a time.

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The patient should be advised to avoid all solid foods for several weeks after the connecting wires have been removed.

The eyelet anchor wires are removed about five days after the removal of the connecting wires.

The advantages of this method over former methods of wiring fractures of the mandible or maxilla are evident to those who have had experience in treating fractures. The wires are less irritating than wires put on by other methods and very much less irritating than so-called fracture bands. If the eyelet anchor wires are made carefully with pliers having smooth working surfaces instead of the serrated ones there is absolutely no reason for the eyelet anchor wires breaking. The only wires which may need tightening after the wires have been placed are the connecting wires. So these connecting wires may be twisted too much and break. However they are readily replaced as has been explained in another paragraph. When other methods are used it is necessary in most cases to replace all mandibular and maxillary attachments on one side if one wire is broken. When the eyelet anchor wires are properly placed, the direction in which the forces are working may be more accurately controlled than by any other method which I have used or have seen used in treating fractures of the mandible or maxilla.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

PROBLEMS OF DENTAL RADIOGRAPHY*

By Dr. A. R. Ebenreiter, Los Angeles, California

THERE is nothing in dentistry about which there is so great divergence of opinion as there is in the production of radiograms. Radiograms that some dentists deem good, others will criticize so severely that the radiographer is often at a loss as to what to do. The prospects for a dentist who

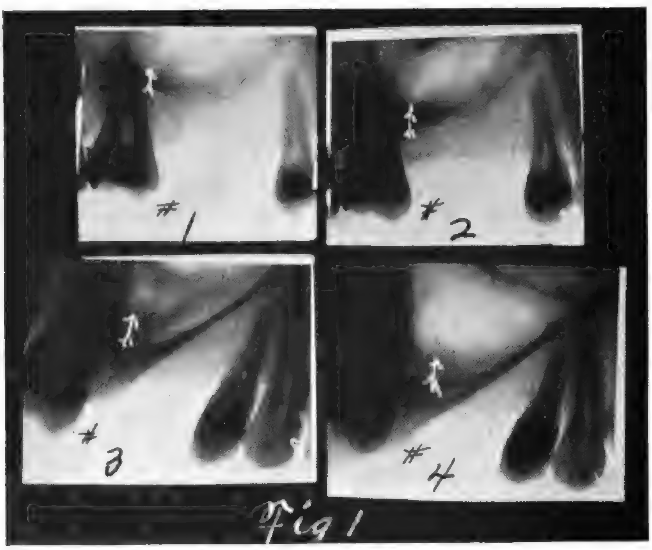

Fig. 1.—Demonstrating the necessity of radiograms from different angles. Patient suffered from continual headache, dizziness and fullness on left side of face, antrum involvement suspected. An operation on the antrum was performed, the root fragment removed, the antrum treated for several days, the above symptoms finally disappeared entirely. No. 1 shows a slight abnormal radiolucency in the antrum, but not sufficient evidence for a radical operation. No. 2 shows this radiolucency more clearly. No. 3 shows evidence of root fragment in the antrum. No. 4 shows the root fragment plainly, also the pathology around it.

has been actively engaged in his profession for many years and who wishes to specialize in radiography are not very promising.

Some years ago, and not so many at that, when x-ray phenomena were

*Read before The American Society of Dental Radiographers at Los Angeles, Cal., July 19, 1922.

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first discovered, and when it had been demonstrated that radiograms of the teeth could be produced, the dentists everywhere were agog. They thought that their troubles in making a diagnosis were largely at an end. But when they found that a radiogram was not a photograph, and did not necessarily picture the condition as it really existed, it came into disrepute by some of the dentists who were ever ready to voice their opinions in this respect. Finally the laity became suspicious and a great many of them came to the conclusion that the x-ray was but a medium for getting a little more money from the patient and I am sorry to say that this impression was helped along by some of the unscrupulous of the profession. Finally when the radiogram came into its own, numbers of dentists began to impress upon their patients the necessity of the radiogram as a means of a more accurate diagnosis. The result was that there was a call for some one to take up this line of work, and before it was realized what had happened, individuals who had

Fig. 2.—This radiogram shows root fragment of upper molar, also the coronoid process of the ramus. This process is sometimes mistaken for root or finger holding the film.

Fig. 3.—Extensive destruction of alveolar process around the molar, mesial and distal buccal roots being completely denuded of all tissues.

Fig. 4.—An impacted upper third molar, slight absorption of the apices and an apical pericementitis, also calcific deposit in the pulp of the second molar.

Fig. 5.—A fragment of a hypodermic needle apparently near tooth. This radiogram was taken to check up canal filling.

more training in the fundamentals of commercialism than the professional men, saw the future possibilities of conducting laboratories for financial gain and social prestige. With the encouragement given these persons by representatives of the different manufacturers of x-ray machines, this branch of dentistry soon fell into the hands of those who were no more qualified to do this work than persons who had not the necessary education and training to perform any other operation in the field of dentistry or medicine. I say this because I feel that radiography is one of the most important branches of dentistry today which, in many instances, is in the hands of persons not

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qualified for this work. The result is that the public suffered and consequently the dental profession also. We have gone at this work in the wrong light. Before we went into the production of the radiogram or improved ourselves in the knowledge of normal and abnormal conditions to know when we had a good radiogram or a poor one, we disregarded all that and took for granted that we knew enough about reading radiograms to make an excellent interpretation and thus put the cart before the horse.

The radiogram has been of great service to the dentist. It has enabled him to see what kind of a root canal filling he had put in or what kind of a gingival margin he had in making restorations and many other things which I will not enumerate at this time. In all it has improved dental technic and

Fig. 6.—Fractured root of the upper lateral incisor, also break in the continuity of the alveolar process. Patient was hit by an automobile.

Fig. 7.—A radiogram showing a well defined cyst. The central and lateral incisors were tested for vitality, and it was found that both pulps were dead. These teeth were extracted and a cyst the size of a small hazel nut removed.

Fig. 8.—The mesial horn of the pulp in the first molar near the occlusal surface, a possibility which should always be considered in cavity preparation. The small radiolucent area on the distal may be subgingival caries.

Fig. 9.—A badly broken down lower first molar with extensive destruction of the alveolar process on the distal, and great apical involvement. The inferior dental canal can plainly be seen in the radiogram.

has generally elevated the standard of the dental profession. Any person who interprets or tries to interpret a radiogram, should know what constitutes a good radiogram. The ability to do this requires a thorough knowledge of the normal in order that everything in the existing condition may be perceived as far as it is possible for radiography to show these conditions. A careful study of a great many radiograms is necessary to be able by means

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of the radiolucency and radiopacity seen in the radiograms to recognize them as normal or abnormal. The fault of a great many men is that they are satisfied with one radiogram of any area. For good reasons, some areas should be radiographed from two or three different angles; multiple rooted teeth, teeth where there are anatomical interferences, such as upper molars, should be radiographed at least from two and most of the time from three different

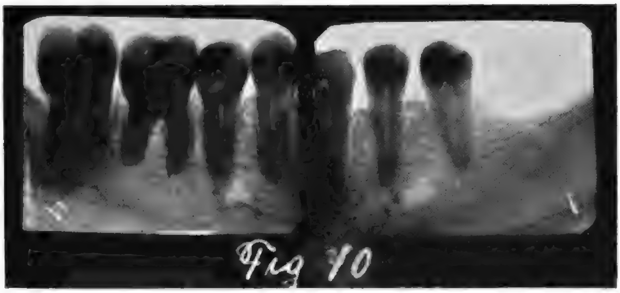

Fig. 10.—In radiogram No. 1 the mental foramen can be seen at the apex of the second premolar, a vital tooth. In No. 2 the mental foramen falls between the premolars. The unbroken peridental lamella is evident in both cases.

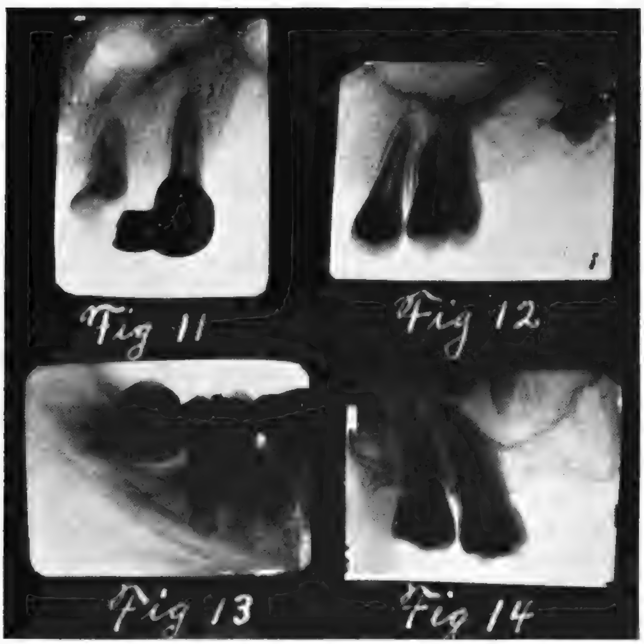

Fig. 11.—An elongation of the incisor root might have resulted in the anterior palatine canal appearing at the apex and being mistaken for a pathological radiolucent area.

Fig. 12.—This radiogram shows an unerupted upper third molar in patient 15 years of age. The gum line and thickening of the peridental membrane and peridental lamella can plainly be seen.

Fig. 13.—Impacted lower third molar with alveolar absorption under crown and a pericementitis around the roots.

Fig. 14.—Radiogram showing a root fragment in the antrum. The floor of the antrum and the radiolucent areas at the site of the second premolar and first molar can be traced.

positions. Lower molars and upper bicuspids require two exposures from different angles. In radiograms for single rooted teeth one exposure can suffice as in those films abnormal conditions can be more easily observed.

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In a complete case, I believe that twenty radiograms should be made to be of value in making a diagnosis. This gives one from two to three different views of each tooth and helps in that it avoids taking a normal radiolucency or radiopacity for an abnormal one. Edentulous areas should be given the same consideration as if all teeth were present.

The radiographer should at all times conduct his laboratory along professional lines, give no information to the patient, and make interpretations to the dentist only when so requested by him. Be ever ready to assist those who desire it to the best of his ability. The radiographer should be thoroughly familiar with the form of energy employed and also his apparatus, so that the highest point of efficiency may be obtained. He should have a knowledge of the dangers of x-radiation to the patient and to himself, always remembering that serious conditions may be the result of his carelessness. The x-ray machine is not fool proof, contrary to the assertions made by the

Fig. 15.--Radiograms showing differences in cancellations of the alveolar process of the white and negro race. No. 1 is of a white patient. Nos. 2 and 3 of a negro.

different factory representatives. In a conversation with a representative of a popular protective insurance company, I was informed that the directors of this and other insurance companies have under consideration at the present time the eliminating of the protective policy for radiographers for the reason that out of the many damage suits brought against operators, the companies have lost every case, mainly for the reason that when the experts of the different manufacturers were called upon the witness stand they testified that there was an element of danger in operating the machine and only the greatest care and caution upon the part of the operator would help avoid these dangers.

The technic for producing good radiograms can only be standardized to a certain extent. Those factors are milliamperage, penetration and distance from target to film. The spark-gap varies on successive days, due to atmos-

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pheric conditions. Tube pointing is impossible to explain on paper. In my opinion, time is the most important factor and it is governed by different conditions, most of all the patient. Age, sex and physique have to be taken into consideration at all times. In conducting a laboratory, one should have a machine of sufficient power and a tube of sufficient capacity for the maximum amount of work required of it. I use a Universal Coolidge tube with a fine focal spot. I find that I get the best results by using 20 milliamperes spark-gap 4¼ inches and a distance of about 19 inches from target to film. The dark room and dark room technic are important factors in producing good radiograms. I regret to say that this end of the work has been greatly neglected by some operators. The dark room factors are a positively dark room, pure water and chemicals. I do tank developing, keep my developing and hardening solutions at a temperature of about 67° F., develop films for four minutes, duplicates five minutes. I use the green light as I find it less hard on the eyes than a ruby light. Last, but not least, is cleanliness, that means cleanliness in every detail. *Avoid all dirt and dust. Keep solutions well covered when not in use. Keep fan clean from excessive oil, and most of all keep hands clean and free from moisture.*

In placing films in the mouths of patients, always have the head of the patient in such a position that the occlusal surfaces of the teeth to be radiographed are on a horizontal plane, placing the film so that the upper or the lower border, as the case may be, is on a line with the occlusal surfaces of the teeth. This will avoid having the teeth radiographed appear crosswise on the film.

In conclusion, I will summarize the points I wish to bring out most clearly in this paper.

1. The radiographer should be a licensed dentist or the work should be done under his personal supervision.

2. Dentists should know a good radiogram from a poor one and demand the best from the radiographer.

3. The radiographer should master a technic that will produce the best results.

4. There should be a hearty cooperation between the dentist and the radiographer at all times.

5. The radiographer should assist in every way possible to raise or uphold the standards of the dental profession.

6. That it requires more than one exposure for nearly all areas and that not less than twenty good radiograms are necessary for a complete set.

7. That radiograms are necessary in beginning dental work and the dentist should check up his work radiographically when it is completed.

8. Teeth with recent canal filling should be checked up radiographically at regular intervals.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Notice Noses in Diagnosis

Q. What caused the root of the left central to appear fractured in these x-ray pictures, when it was not? In this case the incisal third of the right central was fractured and the left central loosened in an accident. After making two pictures I was so sure the root was fractured that I extracted it, but found it was not. When I do this to a sixteen year old boy it is time I was learning something about radiography or quitting it.

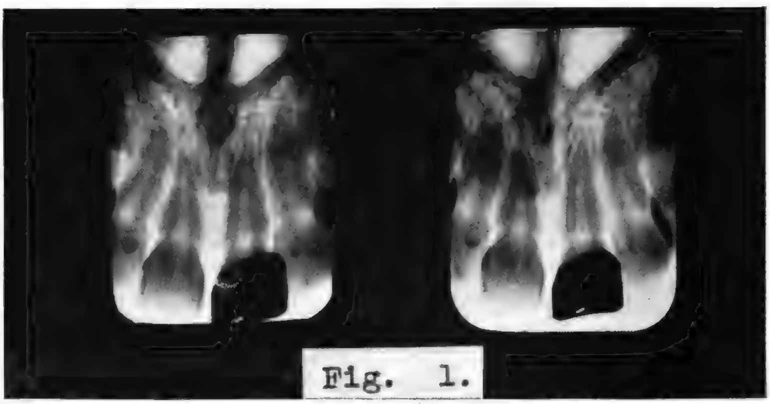

Fig. 1.

A. Yes, it is advisable to learn something about radiography before practicing it on your patients. You are to be commended for admitting the blame, instead of taking the usual course of saying the x-ray lied.

In this case the lower border of the nose is projected across the incisors producing a line quite similar in appearance to an oblique fracture. The change in location of the line in the two views should have warned you of a misinterpretation, if you had not observed the distinct outline of the nose. Doubtless the clinical evidence so strongly indicated a fracture, that slight corroboration was required to convince you. The most inexcusable mistakes in diagnosis and other conclusions are made by blindly following one theory to the exclusion of other possibilities. A diagnostician should approach his problems like a scientific detective, obtaining all available evidence and without prejudice, analyzing it for a cerrect deduction. A tentative diagnosis may serve as a basis for examination, but several theories are better than one, and guard against a single-track mind by being alert for pertinent developments.

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In determining conditions in the maxillary incisor region at least three views are usually required to exclude the superimposed structures. One view parallel with the median line and a lateral view from each side at about 20 degrees from the median line. In the median line view the nose is usually superimposed over the apical half of the roots with the "u" or "v" form of the lower border falling diagonally across the teeth. In the lateral views the nose is projected in the opposite direction and unless it is very large will not obscure the teeth, but the anterior palatine foramen is often thrown near the apex of the central. The nose of the subject should be given equal attention by the radiodontist as by the portraitist. Not only must the angle of the rays be adapted to the form of the nose, but the exposure should be modified to the size. With every conceivable type of nose which is presented from the retroussé to the "moose," the radiodontist may study them advantageously in relation to his examinations. A deflected septum or a marked list of a nose to the port or starboard calls for skillful piloting to avoid the wreck in viewing the incisors.

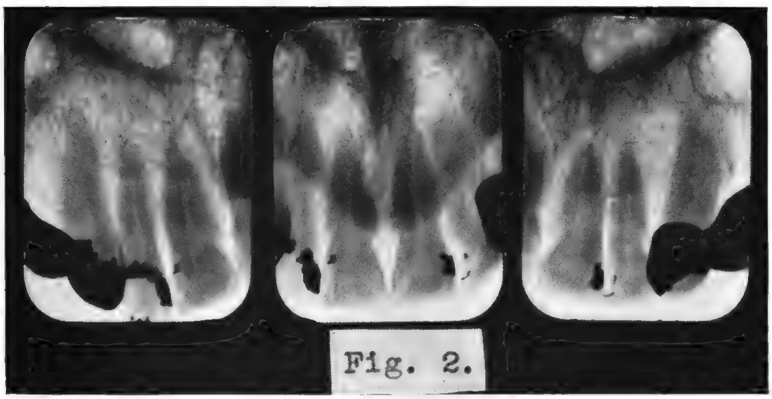

Fig. 2.—An illustration of shifting the nasal shadows in three views of the maxillary incisors.

Beside the outline of the nose there are several sources of confusing lines which may be misinterpreted for root fractures when the search is overzealous. (1) Marginal absorption particularly on the lingual surface of teeth produces a line of varying density which to an inexperienced observer would suggest a fractured root. (2) When the angle of the mouth is drawn upward and backward during exposure, the increased bulk of the contracted muscles causes a sharp line of demarcation diagonally across the maxillary canines. (3) A fracture of the alveolar process is often difficult to distinguish from a fractured root. (4) The wall of a cyst may be in such relation to the roots of teeth that it appears as a fracture. (5) Eccentric angles or the excessive bending of films which superimpose teeth may cause false conclusions including a diagnosis of fracture.

Even with these possible mistakes considered, some difficulty remains in determining the existence of fracture, and the fragments must be displaced sufficiently to show a space, or lack of continuity before the diagnosis is established. In recent fractures the fragments are usually held in apposition by

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the investing tissues and displacement must be induced by suitably applied force. The proper application of the force depends upon the character and direction of the fracture. The wedging of the suspected tooth toward the mesial or distal is most likely to produce lateral displacement of the fragments, while pressure on the labial or traction on a ligature tied round the cervix tends to open a space between the fragments. In addition to manipulation of the exposed fragment, the choice of angle at which the rays are directed is equally important. To demonstrate the space between the fragments the vertico-horizontal angle should parallel the line of fracture, and several attempts at greatly divergent angles are often required to get the

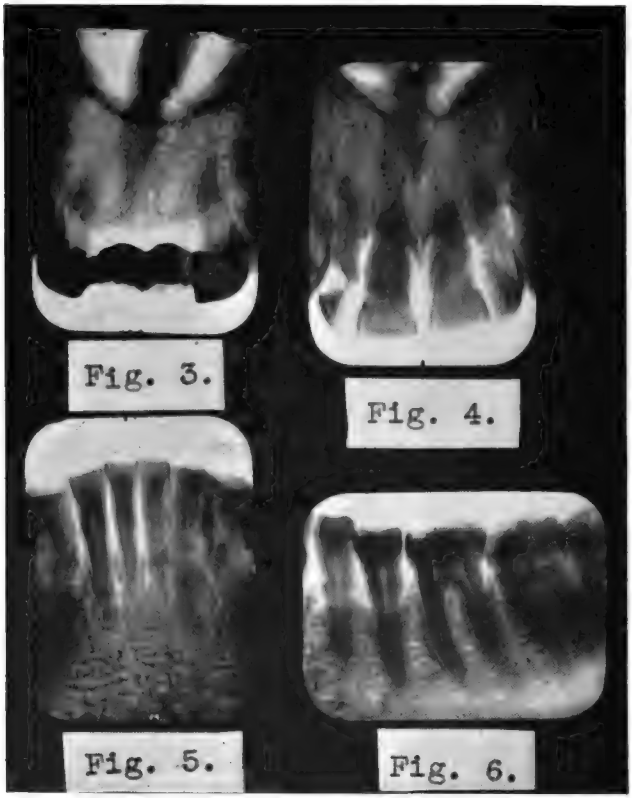

Fig. 3.—Confusing lines from the alveolar margin.
Fig. 4.—Lines of demarcation caused by the alveolar margin and nasal shadows.
Figs. 5 and 6.—Irregular alveolar absorption which might be mistaken for root fractures.

desired result. In demonstrating lateral displacement of the fragments the mesio-distal angle should be shifted to the useful limits in an effort to disclose a decisive break in the continuity. The most difficult type of fracture to demonstrate radiographically is a mesio-distal break through the crown of a mandibular molar. The diagnosis can be made clinically, but the condition of the roots for restoration purposes can seldom be determined without removing the weaker fragment for examination.

A suggestive line of strong contrast in a radiogram is not sufficient evidence of fracture either in roots or the mandible. The "false-alarm" diagnosticians who remove harmless teeth under the pretense of eradicating

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phantom infection may evade the consequences of their acts, but the removal of a perfect tooth on a mistaken diagnosis of fracture demands heroic pleas for absolution. Did the salesman who hypnotized you for the order tell you how to avoid such mistakes as this? No, he told you his machine was so simply perfect that a perfectly simple assistant could make the x-ray examinations, and he would teach her. You have plenty of "sucker" society, but dur-

Fig. 7.—An illustration of the marked differences in radiopacity resulting from muscle contraction.
Fig. 8.—The same case showing the elimination of the line of demarcation by relaxing the muscles.
Figs. 9 and 10.—Outlines of cysts which might be taken for root fractures.
Fig. 11.—A space between root fragments as opened by traction on a ligature around the crown during exposure.
Fig. 12.—Lateral displacement of root fragment by wedging of the suspected tooth.

ing the future years of "bridging it" this patient may suspect that there is a difference between a "unitarian" and a diagnostician, and have decided views on "fool-proof" x-ray units, because he is wearing the proof.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Is the Human Organism an Electro-Chemical Mechanism? G. W. Crile (Cleveland). American Journal of Surgery, March, 1922, xxxvi, 3.

This article is of interest to the dentist because of the remarks on nitrous oxide-oxygen anesthesia. The author first shows that the liver is more important to survival than the brain, for after excision of the former the brain cells rapidly deteriorate. A decerebrate and even a decapitated animal survives if the liver is intact under transfusion and artificial respiration. The deterioration of the brain cells after extirpation of the liver is a specific phenomenon, for other organs remain for the time intact. In order to explain this singular relationship the author propounds his electro-chemical theory. The brain cells are batteries. As a matter of fact all the body cells are batteries. The brain cells are able to cause all other body cells to function. But of all body cells only those of the brain and liver show the phenomenon of sleep. If the animal is exhausted both types of cell show peculiar changes and these point to the need of sleep. The brain cells drive the body cells at large but are themselves dependent on the liver cells for the generation of energy. The practical aspect of this hypothesis has to do especially with shock, exhaustion and anesthesia. Ether at first increases brain conductivity which is later decreased, because the cells no longer receive oxygen and water as a result of isolation; and this behavior is due to the action of the anesthetic on the permeability of the cell membrane, which, originally increased is later decreased. Not less important than exclusion of oxygen and water is retention of katabolic products, within the cell. Under nitrous oxide-oxygen on the other hand the cell membrane permeability is much less increased and under full anesthesia practically remains unaltered.

In any kind of exhaustion, whether from traumatism or operation or insomnia or psychic causes or toxemia, the electric conductivity of the brain cells is decreased while that of the liver cells is increased. The liver is in fact the only organ of the body which exhibits this positive behavior. In the case of prolonged insomnia long rest periods are followed by return of conductivity to the norm. Adrenalin first increases and then diminishes brain conductivity. In certain bad surgical risk operations, as gallstones in the

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common duct with jaundice, chills and fever, an abundance of water should be given before operation. Exhaustion, present or future, connotes accumulated waste products which require enough water to facilitate intracellular drainage. This is by no means due principally to simple retention for in these subjects metabolism is actually increased. Water should also be given after operation, by hypodermoclysis if the patient be unable to drink. Fear states which affect the acid-alkali balance of the cells and fever acidosis should when possible be eliminated. Nitrous oxide-oxygen should be used in place of ether with local nerve blocking. The type of operation rather than the individual patient determines whether an operative risk is technically bad, and as stated by way of illustration, gallstones in the common duct with the reaction above mentioned is a type of bad risk operation which requires resort to all preventive and postoperative resources.

A Contribution to the Etiology of Feeble-Mindedness, with Special Reference to Prenatal Enamel Defects. L. Pierce Clark and Chas. E. Atwood (New York). New York Medical Journal, May 17, 1922, cxv, 10.

The summary of the paper by two well-known neurologists is as follows: While there can be no doubt that defective enamelization of the teeth is the register of a gross teratological fault, we do not know whether this is a metabolic or a developmental defect in the broadest sense, or partly the result of a coexistent infection process in the mother or fetus at the time of the defective enamelization. Probably the strict accountability of infection as a cause of the fault cannot long be maintained, not only from our few data but upon general histopathologic grounds. Whichever, or both, of the forming causes is held, certainly the injury to a perfect enamelization is not coincidently registered in a neural tissue of the brain. Defective enamel in a questionable feeble-mindedness is therefore not of immediate diagnostic moment as far as the possible coincident injury to neural tissue is concerned. The metabolic and infectious cause of defective enamelization still remains obscure.

In conclusion the authors would like to urge for general discussion: 1. To what extent is feeble-mindedness exclusively hereditary? 2. If brain lesions are present in such a large majority of cases coming to autopsy, are such tissues of etiologic moment in the causation of the mental defect or are they but secondary to the symptomatic pathology of the gross picture of the disease? What are the gross teratological defects in feeble-mindedness which are of etiologic moment?

Explosion of Ethyl Chloride from a Glass Defect. K. Jalowicz (Berlin). Zahnaerztliche Rundschau, April 25, 1922, xxxi, 16.

This accident is one of the most rare encountered by the dentist. The author, who is connected with the School Dental Protective Clinic, has had this rare mishap befall him twice within a short time. On the first occasion he had barely opened the valve when with a dull explosion the flask gave way at its upper portion and the spray from the still half-filled bottle was scat-

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tered in all directions. A boy who was in the chair ready for treatment received the full force of some of the chloride in the face and developed a violent bilateral conjunctivitis, which however had subsided notably three hours later. Fortunately no glass fragments had entered the eye. The quality of the anesthetic was not accused or the care in storing it, and there only remains the possibility of a defect in the glass, which view could not well be verified as the flask had been shivered. The second case of this accident is not mentioned and was doubtless a duplicate of the first.

Etiology and Pathogenesis of Cleft Tongue. Editorial, New York Medical Journal, March 15, 1922, cxv, 6.

It is self-evident that there can be no clear knowledge of this subject without a study of modern embryology. The tongue develops from an anterior and two posterior buds. The former appears as a median tubercle in the buccal floor in the meso-branchial space and gives rise to the base and tip of the tongue. The pharyngeal portion of the organ is formed by the persistence of two slight furrows, corresponding to the second pair of branchial clefts. These furrows develop into buds and the latter become covered eventually by the backward development of the anterior bud, separated by a V-shaped sulcus, the apex of the V being marked by the foramen cecum. Both cecum and sulcus are eventually effaced. In front the anterior bud rises and projects over the inferior maxilla, becoming the mobile anterior portion of the tongue.

Embryology explains a trifid tongue by noncoalescence of the three primary buds, but a bifid tongue is not so readily accounted for and several theories are available, the best being the external intervention of amniotic adhesions, which is the favorite explanation of atypical defects in general. With amniotic adhesions may be considered the rôle of embryonal neoplasms originating in the branchial clefts. The situation of the tongue is very favorable for either of these anomalous developments. In some of the reports of cases of cleft tongue embryonal tumors coexist while in others they are quite absent. The growth of the neoplasm readily interferes with normal development, here as elsewhere. In other cases cicatricial tissue points equally to amniotic adhesions. To seek an explanation of the adhesions and tumor formation some cases occur in hereditary syphilitics and the progeny of alcoholics, but such factors cannot explain all cases.

Dentofacial Maldevelopments and Their Correction. A. P. Rogers (Boston). Archives of Pediatrics, March, 1922, xxxix, 3.

These anomalies occur in the well-to-do and robust as well as in the poorly nourished children of the indigent. Nevertheless there is a connection between the most pronounced of these maldevelopments and deficient vitality, although they may be limited to the teeth and dental arches. They may be apparent before or at the time of the eruption of the teeth; or not until later, around the time of permanent dentition. The term hereditary is very mis-

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leading and to assert it successfully it would be necessary to exclude environment; since slight changes in the food, temperature, moisture and other topical factors can influence development seriously. In civilized lands as a rule the diet does not give the jaws the growth stimulus seen in primitive peoples. In other words functional activity plays a notable rôle in development. The habit of thumb-sucking in the causation of "buck" teeth, etc., shows the sensitiveness of the rapidly developing organism to slight exogenous determinants. The maldevelopment here is extreme, the causal factor apparently insignificant. Maldevelopments may interfere with proper mastication, while speech defects are often coexistent and the general picture may be that of a marked degree of mental defect although the intellectual functions may be quite intact. In orthodontia as applied to these cases in addition to securing occlusion the muscles of mastication should have their activity stimulated with the aim of assisting the development of the dental arches, bearing in mind that if occlusion is imperfect the condition may be aggravated.

Report of Roentgenographic and Clinical Findings in the Teeth of 900 Patients. Matthew F. Eusterman (Mayo Clinic). The Journal of the National Dental Association, March, 1922, ix, 3.

All of the patients were referred to the Mayo Clinic within a period of three months, and the research was for the detection of possible foci of systemic infection, carried out as a matter of routine. Two thousand and ninety-nine pulpless teeth were found in these patients, an average of more than 2 per person. Twenty per cent only of these teeth were negative to the x-ray, giving 80 per cent with some sort of alteration. In 789 patients whose occlusions were determinable, 244 were normal or nearly normal. The remainder wore dentures and occlusion could not be considered. In 280 patients, or 31 per cent, the gums were apparently sound. There is thus a superposition of sound gums and normal occlusion which indicates that malocclusion favors pyorrhea. The number of teeth removed from the 900 patients was 2619, exclusive of 254 remaining roots, which represents about 7 per cent of the total number of teeth, counting 32 per person. The indication for removal was devitalization, caries or pyorrhea. But 45 separate areas required postoperative curettage.

Most of the pyorrhea was incipient, for only 5 per cent of cases presented osseous destruction, recession of gums and loose teeth. In 82 per cent there was suppurative gingivitis and in the remaining 13 per cent mild gingivitis Impacted teeth, mostly (60 per cent) lower third molars, were found in 13 per cent of patients, and more often in males than females. The health of this group was poor and hence they were suspected of focal infection. The prevalent diseases were of the stomach, gall bladder, appendix, kidneys, urinary bladder and joints.

The only link in the mind of the old time dentist between dental defects and the general health was imperfect mastication. Hence the physician was of no assistance to him in restoring a patient's good condition. Physicians

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did not refer patients to dentists for the same reason, excepting of course for strictly dental activities. Today there is coöperation, or should be, all along the line. Recently the author reported a series of patients with dentures, 290 in number, in which the roentgenograms showed 129 remaining roots, 9 residual areas of infection, and 13 unerupted teeth; all of which were covered by the dentures, which had been in place on an average of eight years. Of these mouths 35 per cent harbored infections. If extraction of infected teeth fails to improve chronic arthritis, etc., this does not necessarily mean that the arthritis was not originally of dental origin, but rather points to the fact that long duration of the condition has made it excessively resistant to treatment of any kind; nor does the fact of recovery under a certain plan of treatment unconnected with the teeth justify drawing the same conclusion. In these cases all available resources should if necessary be combined.

Effects of Endocrine Derangement on the Dental Tissues. F. W. Broderick (Bournemouth, Eng.). New York Medical Journal, March 15, 1922, cxv, 6.

The search for constitutional factors in the origin of dental caries is comparatively recent. The author gives to Ewan Walker of Birmingham, credit for priority in this direction, when he suggested in 1910 that thyroid insufficiency might be a factor. In 1914 Mrs. Mellanby accused the fat-soluble vitamine, or rather its absence from the diet, as another factor. For a number of years past the present author has been emphasizing the importance of endocrine derangement in the etiology of caries. Granted that the exciting causes of the latter are those at present taught—carbohydrate stagnation, fermentation and solution of enamel through local organic acid formation, a correct endocrine balance is able to prevent this accident; and of the two causes the predisposition is the more important. The integrity of the enamel is the crucial factor and this organ is composed almost entirely of lime salts. The calcium of the body occurs fixed in the tissues as inorganic salts and free in the fluids as ionic salt. The fixed lime was originally free. The calcium ions are indispensable for the functioning of the neuromuscular structure. There is ordinarily plenty of lime in the diet, but the diet lime is not always utilized and even if absorbed may be eliminated by the kidneys without becoming ionic lime. In mere lime shortage, addition of diet lime may correct the conditions due to deficiency and even plenty of diet lime will sometimes correct the results of imperfect utilization or precocious elimination. But to this manner of making good there are very decided limitations. The calcium hunger of the growth period of life must be met with diet lime and in an absence of the latter, rickets and tetany are favored. Later in life it is the pregnant woman who develops lime hunger and suffers from lime deficiency. In old age lime is a liability. When there is plenty of diet lime, yet evidences are not wanting of lime shortage, some constitutional factor must be at fault and this factor is derangement of endocrine balance. The author has learned that ionic lime is deficient in children who are convalescing from measles and scarlet fever, by the simple method of measuring the quantity

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of acid necessary to neutralize the alkaline saliva. This low calcium index was corrected by giving the children pluriglandular extract. Apparently with normal endocrine balance the child is able to store or retain calcium. Derangement means calcium waste or underassimilation or both. Experiments show that parathyroid, suprarenal and pituitary extracts with calcium lactate restore the normal alkalescences. Generally speaking low alkalinity favors caries while high alkalinity is compatible with pyorrhea.

Lack of space makes it impossible to follow the author through other particulars of endocrine derangement, but from his summary we learn that in all probability calcium shortage is one of the chief manifestations of disturbed endocrine balance and that the tendency of calcium deprivation is to set up one form of acidosis. The latter in its highest form involves not only ionic calcium but the fixed lime of teeth.

Early Diagnosis of Pyorrhea. T. P. Hinman (Atlanta). The Dental Cosmos, February, 1922, lxiv, 2.

In his paper entitled "Diagnosis of Gingival Lesions, etc.," the author has this to say of pyorrhea. The early diagnosis of the primary form is probably more neglected than anything in dental practice. Many patients neglect to consult the dentist for bleeding at the gums, or do not call his attention to the fact. The dentist therefore should invariably examine the gums of his patients and it is only necessary to compress the gums between the index fingers of both hands, one finger on the lingual and the other on the buccal side, the interdental portion of the gum receiving the pressure. In a majority of patients examined there will be some exudate, ranging from a slight mucoid flow to a profuse discharge of pus; and in quite a few instances there will be only objective evidences of any gingival disturbance.

In pictures taken of pyorrhea cases the condition of the surrounding bone is clearly shown and if the disease is of the infiltrative type the chances of successful treatment are extremely meagre. All have experienced disappointment in treating cases of this type, because after careful treatment the gingiva does not heal and the flow of pus soon returns; in fact it is seldom that it stops entirely. This condition is clearly shown in the x-ray picture.

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EDITORIALS

Newer Knowledge of Nutrition*

WHEN Dr. McCollum published the first edition of his work on nutrition it marked a new milestone in the study of diet in relation to general health.

The second edition is much larger than the first and takes up a general review of the research that has been done by other men on different foods.

Dr. McCollum's experiments as well as those by others seem to show that chemical analysis of food is not an accurate basis in regard to the nutrient value of foods. Some have a very similar chemical composition, yet produce different results from a biological standpoint. In fact, it might be said that the real knowledge of nutrition which begins with chemical investigations, must be further substantiated by animal experiments. The

*"Newer Knowledge of Nutrition," by C. V. McCollum, Professor of Chemical Hygiene, School of Hygiene and Public Health, Johns Hopkins University. Macmillan Company, New York.

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feeding of different kinds of food to animals in laboratories has shown certain results which have later been substantiated by investigations along other lines.

Dr. McCollum also shows, as do other investigators whom he quotes, that a diet composed of a single food always results in faulty nutrition. Probably one of the most startling facts to the laymen is that certain foods which are supposed to have a highly nutritive value are insufficient to maintain a healthy individual. Of particular interest to the dental profession is that portion of the book dealing with dietary deficiency diseases, in which it is clearly shown that foods play a great part in the production and the cure of these conditions.

The chapter devoted to etiology of rickets is especially valuable to the orthodontist, as well as the chapter which deals with suitable food for the growing individual. To those interested in the question of nutrition, there is no book that will be so interesting to read as Dr. McCollum's second edition of the "Newer Knowledge of Nutrition."

Dr. McCollum's years of experimentation with diet especially fit him for the writing of this book.

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ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

American Academy of Applied Dental Science

The Fourth Annual Meeting of the American Academy of Applied Dental Science will be held at Miami, Florida, January 8, 9, 10, and 11, 1923.

All ethical students of progress in both the medical and dental professions are invited to take this short course in Orology-Health Dentistry. Papers, clinics and some educational classes free.

For information write Convention Headquarters American Academy Applied Dental Science, Congress Building, Miami, Florida, or Chamber of Congress, Miami, Florida. Dr. H. L. Madison, Cor. Sec., Burlington, Ia.

Notes of Interest

Dr. S. B. Hoskin announces the opening of his office at Morgan Building, Portland, Oregon, for exclusive practice of orthodontia and dental radiography.

Dr. M. J. Lentz announces the removal of his office from 1019 Broad Street, Newark, N. J., to 305 Clifton Ave., Clifton, N. J.

Mrs. James McCausland announces the marriage of her daughter Pearl Isabelle to Dr. William A. Murray on Tuesday, September 12th, 1922, in Chicago, Illinois.

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ORIGINAL ARTICLES

A CONTRIBUTION TO THE MECHANISM OF GROWTH OF THE HUMAN FACE*

BY SIR ARTHUR KEITH AND GEORGE G. CAMPION, L.D.S.

IN THE spring of the present year the two authors found that they were investigating the same problem—namely, the growth of the face in childhood and youth—by different methods. While one (G. C.) was measuring the amount of growth which takes place at succeeding age periods, the other (A. K.) was seeking to determine by the study of immature and mature skulls the sites at which such growth takes place. Both authors are and were of opinion that the entire face is essentially a part of the apparatus of mastication and that irregularities of the jaws, in size, shape and position, can be explained only when a study is made of the ingenious and elaborate mechanism which underlies growth of the face as a whole. The authors have consequently pooled their results.

For measurement of the forward growth of the face—growth forward in a sagittal plane—the external auditory meatus has been taken as a base from which to estimate the forward movement of various points between forehead and chin. Sutural lines at which this advance takes place involve not only those lying in the face, but particularly those situated in the base of the skull and in the lateral wall of the skull. Growth of the face in height, as measured from the nasion to the lower margin of the chin, is confined to sites and sutures of the face, as above defined. In the opinion of one author (A. K.) the supraglabellar depression marks the upper limit of the masticatory face, but unfortunately its limits are so often imperfectly marked that it has not been included in our measurements. In the present paper the side

*Paper read at the meeting of the British Society for the Study of Orthodontics, December 5, 1921.

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to side or lateral increase of the face is only dealt with by one author (A. K.). In his opinion the most frequent derangements of growth, seen in modern English faces, is due to a deficiency or alteration in the lateral expansion which ought to take place in normal children. The most important suture involved is that between the maxilla and malar or jugal bone on each side of the face. Evidence will be adduced for believing that the median sagittal

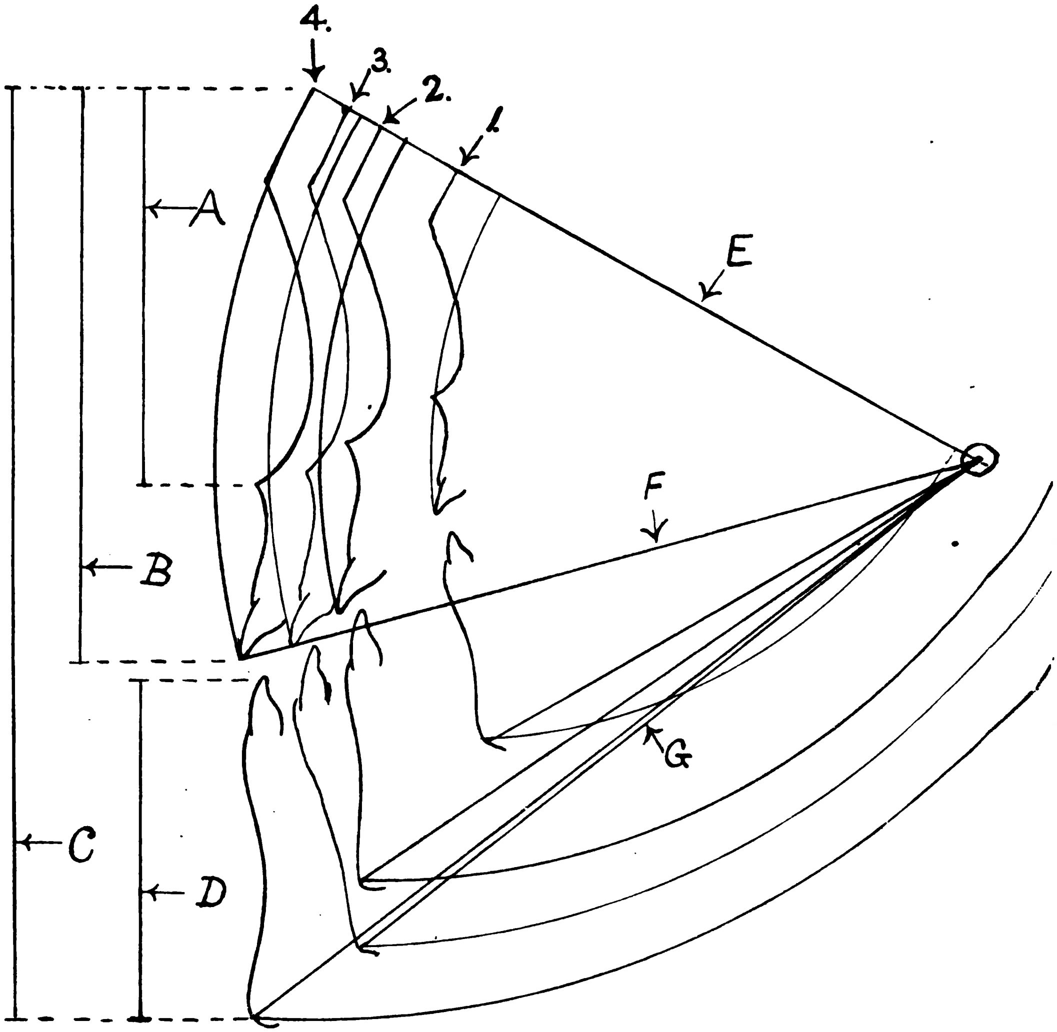

Fig. 1.—Diagram, showing vertical and forward growth of the normal or subnormal face. Vertical measurements taken from nasion, forward measurements from trans-meatal axis. The arcs centered at the meatal axis show the progressive growth forwards along line F in relation to that along line E. The arcs centered at the nasion show the progressive vertical growth along line C in relation to that along line E.

suture of the palate takes a very active part in adding to the palatal width. There are also reasons for believing that the bone-substance which surrounds dental buds and sacs, as well as tooth sockets, is controlled by a mechanism which differs from that regulating bone growth in the rest of the face. Further, it will be shown that the distance beween one temporo-mandibular joint

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and another is dependent on growth at the base of the skull. The width of the base of the skull and of the face is increased by bone being laid down in the spheno-temporal suture. The base of the skull is transformed in size and conformation between the 5th and 18th years to a much greater degree than is usually realized. Lastly, it will be demonstrated that the acromegalic face is enlarged by a process of true growth.

Profile 1. From child age 3 years and 6 months
" 2. Represents mean of 10 children aged 9-11 years.
" 3. " " 9 " " 15-16 "
" 4. " " 10 adults (Campion).

TABLE I

MEAN AND STANDARD DEVIATIONS (CAMPION).

Vertical Growth.

		9-11	15-16	ADULT
A.	Nas. to Sub-nas. point	42.9±2.55	49.3±2.26	53.2±3.75
B.	Nas. to Upp. Inc. ..	64.0±2.19	72.6±4.11	76.7±4.56
C.	Nas. to Sub-mental point	100.1±2.60	111.4±5.49	122.8±7.67
D.	L. Inc. to Sub-ment. point	35.8±1.17	40.8±1.83	44.7±3.34

Forward Growth.

		9-11	15-16	ADULT
E.	Trans-meatal axis to Nas.	89.9±4.1	95.6±3.16	100.4±3.87
F.	Trans-meatal axis to Inc.	86.6±2.97	94.0±4.29	100.6±6.36
G.	Trans-meatal axis to Mental eminence ..	98.6±3.67	104.3±4.9	119.9±8.65

In Fig. 1 are summarized the results obtained by measurements made on the living face—the number of individuals included being mentioned in the legend to the illustration and the means of the measurements reproduced in Table I. The first question we seek to answer on this paper is: How does the forward growth of the face take place? The advance is measured from the trans-meatal axis or line—one passing through the center of the ear passage on each side of the head. We shall take first the advance of the nasion, which is moved in a forward direction owing to new bone being laid down somewhere along the line *E* (*E*, Fig. 1). The points at which such bone is laid down may be seen in Fig. 2, where a sagittal mesial section of a child's head, aged 5 years, is superimposed on a corresponding section of a skull of an Englishman with a well-formed face, with dimensions rather above the average. The superimposition has been made so that pituitary fossa falls on pituitary fossa, and cribriform plate on cribriform plate, because a prolonged experience has shown one of us (A. K.) that the pituitary or sphenoid region serves best as a fixed point in comparing the development or growth of one skull with that of another.

As represented in Fig. 2, the nasion has advanced by growth from a point 73 mm. in advance of the trans-meatal axis in the 5th year (*A*) to one 96 mm. in advance, in the adult *B*; in the space of some sixteen years 23 mm. of additional bone has been laid down at various points along line *E*; 5.7 mm. of new bone is laid down in the forward line *E* from the 10th to the 16th year, 4.8 mm. being laid down after the 16th year. The length of the line *E* on newly-born children is about 48 mm.—but the exact amount must be de-

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termined—not in the dried skulls at our disposal, but in moist skulls, with the cartilaginous parts unshrunken. Broadly speaking, the line *E* is doubled in length by the growth which takes place from birth to adult age. From the standard deviations given in Table I, it will be seen that the line *E* is the least variable of the three forward measurements.

In Fig. 3 is given a diagrammatic analysis of the sites of growth along line *E*. Growth occurs at three sites in the basal part of the "*E*" or naso-

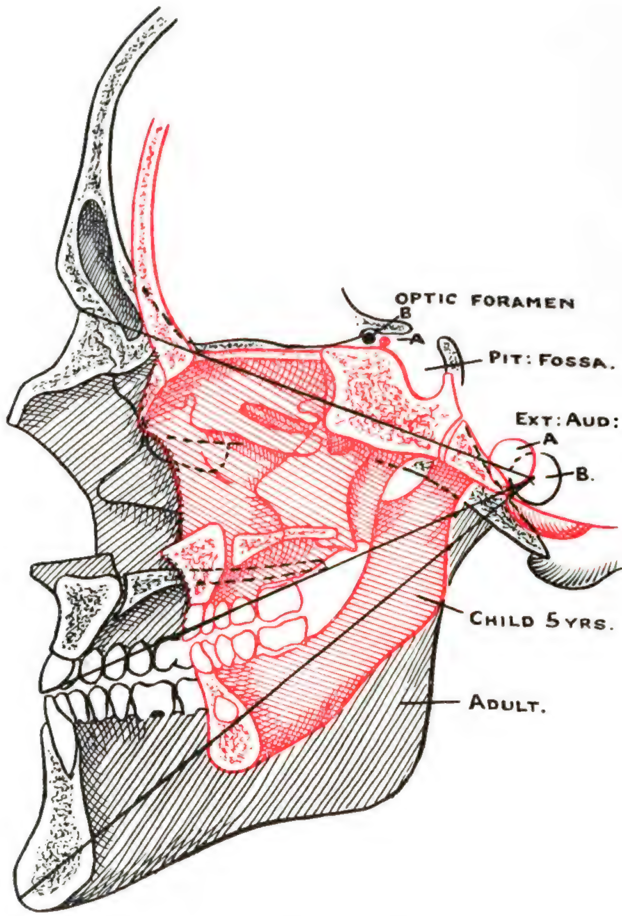

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Fig. 2.—A: Sagittal mesial section of skull of child with M¹ about to erupt, and estimated to be five years of age. B: Corresponding section of skull of adult Englishman. The skulls are superimposed so that the pituitary fossæ and cribriform plates correspond. The sections show the amount of growth in the sagittal mesial plane from the 5th to the 25th years.

meatal line, viz., at the fronto-nasal site (*A*); spheno-ethmoidal junction (*B*) and at the spheno-occipital junction (*C*). In the samples chosen, the nasion has been advanced 23 mm. from the 5th to the 21st years; 7 mm. has been obtained by deposition or addition to the outer surface of the naso-glabellar region of the frontal, and by the formation of the frontal sinuses; 10 mm. have been interpolated at the spheno-ethmoidal junction; the remainder 6 mm. at the spheno-occipital junction.

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Taking these sites of growth in the order shown in Fig. 3 we see that at the fronto-nasal region (*A* in Fig. 3) the nasion, in the samples chosen, has moved in an upward and forward direction to the extent of 11 mm. from the 5th to the 25th years. The cribriform plate was taken as a fixed base from which to measure the upward movement of the nasion. This upward movement at first surprised us, but on further investigation we find this to be the rule in modern English skulls, but in the skulls of primitive native races and in prehistoric English skulls this upward movement is usually replaced by one in a forward, often combined with a downward direction. The important point to note is that this naso-glabellar addition has nothing to do with growth of brain; it is directly related to the development of the masticatory apparatus; the supra-orbital and glabellar regions of the frontal bone are intrinsic parts of the bony scaffolding on which the maxillæ are set and from which the muscles of mastication exercise their power. The bone laid down at this site is a superficial deposit on the naso-glabellar surfaces of the frontal

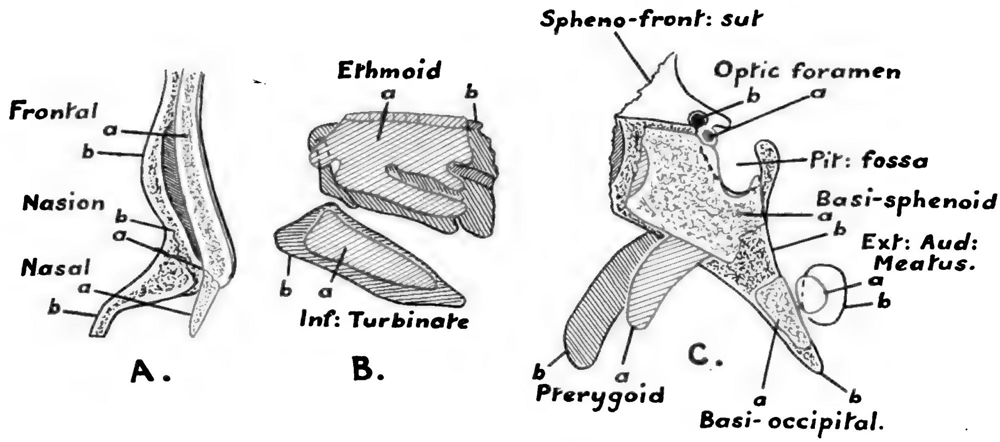

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Fig. 3.—Sites of growth along line E in basal parts of skull (a) child, aged five (see Fig. 2); (b) adult (see Fig. 2). A: Fronto-nasal element; B: Ethmoidal element; C: Sphenoidal element.

and nasal bones. The upward and forward growth of the nasion gives the high frontal root to the nose seen in the classical statuary of ancient Greece.

The amount of growth at the fronto-ethmoid junction (*B*, Fig. 3) appears to be very restricted, but it is otherwise at the spheno-ethmoidal junction. This suture is concerned not only in the growth of the face, but also in the increase of the nasal cavities and particularly of the brain space. At this junction growth takes place by the transformation of cartilage into bone; as we shall see later, it is part of the great coronal system of cranial growth-sutures—a system involved in facial as well as cranial growth. Our chief interest in the spheno-ethmoidal suture at the present moment is because it is concerned in providing space for the erupting maxillary molars. About thirty years ago,* one of us (A. K.) showed the importance of the pterygo-

*"The Relationship of the Eruption of the Permanent Molar Teeth to the Expansion of the Maxillary Sinus."—*British Jour. Dental Sc.*, 1902, vol. 45, p. 529.

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maxillary suture during the growth of the upper jaw and the eruption of the upper molars. One of the illustrations then published is reproduced here (Fig. 4). A glance at Figs. 3*A* and at Fig. 4 shows that the spheno-ethmoidal cartilaginous junction and the pterygo-maxillary fissure are parts of the same coronal sutural system—one where additional alveolar and maxillary space is obtained during the eruption of the permanent molars. It is true that in the disorders of growth known as achondroplasia (2), and also in another disorder, acrocephaly, there is a profound arrest of growth in the spheno-

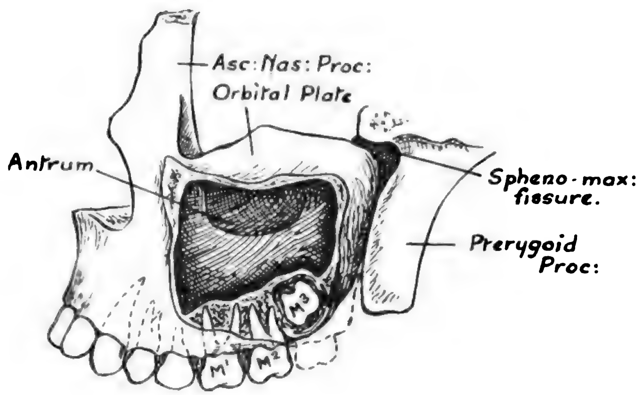

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Fig. 4.—Sagittal section of the maxilla of male aged nineteen, with crown of third molar still unerupted. The growth of the alveolar border and the position of M^3 when in place, are shown by stippled lines. The external pterygoid process and pterygo-maxillary fissure are also shown.

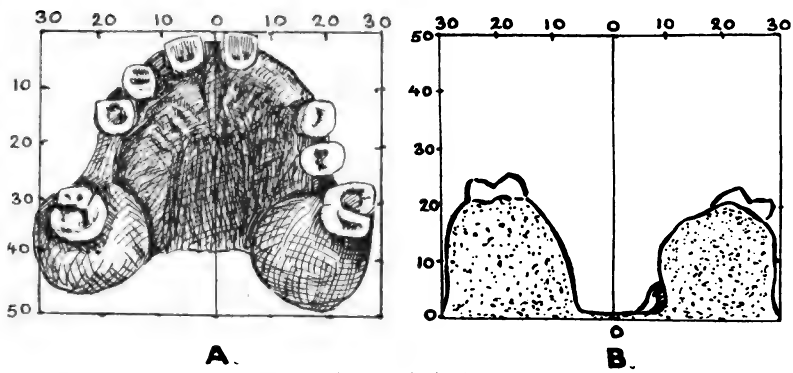

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Fig. 4*A*.—Drawing from cast of palate of young woman. B represents a coronal section at sites of alveolar enlargement.

ethmoidal junction without any failure in the development of the molar part of the maxilla. In achondroplasia the maxillary part of the face undergoes the rotatory movement so well illustrated in the snub-face of the bull-dog, and thus obtains molar space; in acrocephaly (2) compensation is got in another way.

The important part taken by the pterygoid process in the machinery of facial growth in a forward direction is indicated in Fig. 3*C* and Fig. 4. From the 5th to the 35th years, in the samples chosen in Fig. 3*C*, the lower

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part of the pterygoid process has extended in a forward direction to a distance of 9 mm. and in a downward direction to about an equal extent. During the years of growth the pterygo-maxillary fissure is being moved forwards, which indicates that the maxilla as a whole must also be moved. Throughout this period, too, new alveolar bone is being laid down in the molar alveolar region, immediately in front of that part of the pterygo-maxillary fissure which is occupied by the tuberosity of the palate bone. There is a class of case, a fine example of which is at present under the observation of Sir Francis Farmer, where there is no forward movement of the maxillæ, the alveolar bone, which should have formed the sockets for the upper 2nd and 3rd molars being heaped up as a mass on each side of the palate in front of the lower or palatal ends of the pterygoid processes.

We now come to the third of the deep sites involved in the growth along the line *E* (Figs. 1 and 2). The growth in the spheno-occipital cartilaginous junction, from the 5th to the 25th year is about 9 or 10 mm. in extent (see Fig. 3*C*), but not more than 5 or 6 mm. are added to the extent of the naso-meatal radius. For this reason: the growth at this suture is concerned chiefly in giving pharyngeal space—space for breathing and swallowing. It will be noted (Fig. 3*C*) that this growth junction lies in front of the external auditory meatus; growth at the junction leads to a displacement of the temporal bones and ear passages in a backward and downward direction; there may also be a forward movement of the sphenoid, but in a system of relativity, such as the growing skull is, it is most convenient to regard the body of the sphenoid as a fixed basis which, for practical purposes, it is. The increase at the spheno-occipital junction thus increases the *E* line by carrying the meatal base backwards and downwards to an average extent of some 5 or 6 mm. Space is thus obtained for growth of mandible, throat and mouth. In achondroplasia, growth at this suture ceases at birth or soon after, a series of compensatory growth mechanisms being brought into play to give the needed pharyngeal space.

So far we have merely examined and illustrated the *deep* sites of growth concerned in the increase of line *E*; the more superficial sites concerned we can examine more conveniently at a later stage. We now turn to the sites of growth concerned in line *F* (Fig. 1), where the increase is estimated by measuring from the transmeatal axis to the incisive margins of the upper central incisors. The structures and sutures involved in this line are represented in Fig. 2, while in Fig. 5 an analysis is given of the amount of increase at the various sites of growth along the line. As may be seen from Table I, the incisive margins of the upper central incisors were 86.6 mm. in front of the trans-meatal axis in the 10th year; by the 16th year they had reached 94.0 mm., an increase of 7.4 mm. in six years, while the point reached in the final period of advance was 100.6 mm., showing an average increase of 6.6 mm. during the later years of adolescence—the years in which the 3rd molars were, or should have been, erupting. One very interesting point is brought out by this table of measurements. At the 10th year the *F* line showed a much greater degree of stability than the *E* line

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as measured by the standard deviation; but by the 16th year matters had become reversed; in the individuals measured, the *F* line fluctuated in its dimension much more than the *E* line; some growth factor had come into operation in the "*F*" line, which varied greatly in its incidence, being great in one individual and small in another. This difference in variability becomes even greater in the later stages of growth; the standard deviation for *F* is nearly twice that for *E* in adult skulls. Why this variation should mark growth along the line *E* will become apparent as we proceed.

In Fig. 2 the central incisor crowns lie 73 mm. from the trans-meatal axis in the skull of the 5-year-old child; 106 in the adult. In the samples chosen the incisor crowns have been advanced 33 mm. In Fig. 5 the points at which this increase is obtained are shown. By far the greater amount—about 16 mm.—as is seen in Fig. 5, is obtained by addition at the posterior area of the maxilla—the area lying in front of the pterygo-maxillary fissure, where the molar part of the alveolar margin is produced. The eruption of

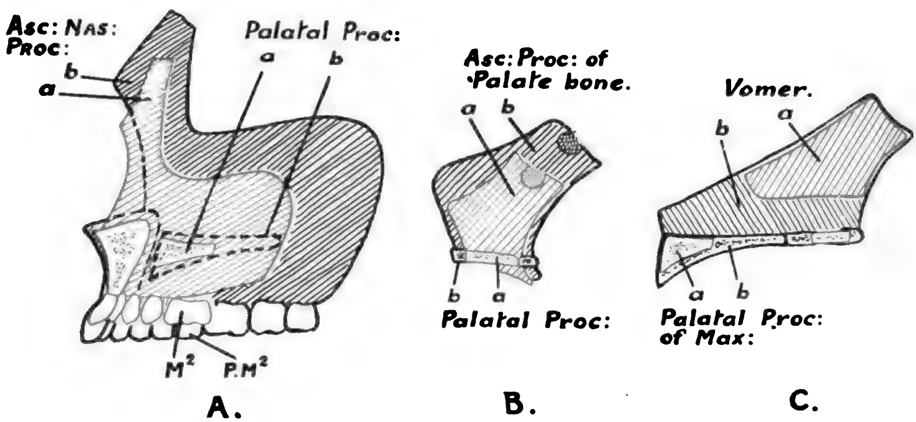

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Fig. 5.—Analysis of growth-sites along line F: A, Maxilla (a), mesial aspect of a child aged five, superimposed on maxilla (b) of adult (same skulls as are represented in Figs. 2 and 3); B, Palate bone (a) of same child superimposed on adult bone (b); C, Vomer and palate (a) of child superimposed on corresponding parts of adult (b).

the permanent incisors extends the *F* line about 5 mm. in a forward and downward direction (Fig. 5*A*). The other sites and structures concerned in the increase of this line have been mentioned already—the forward extension of the pterygoid prop, and the growth at the spheno-occipital suture producing a backward movement in the meatus. The great variability in the length of the line *F* depends very largely on the amount of bone laid down in the molar part of the maxilla and on the forward extension of the pterygoid prop.

The reader will observe in Fig. 5*A* that in superimposing the 5-year-old maxilla on the adult specimen we have taken the naso-palatine canal as the most fixed point, placing premaxilla on premaxilla, and the palatal plate of the maxilla on the corresponding element. At this point the question may be raised: is any point of the growing maxilla more fixed than another? Everyone will agree that the molar region of the adult jaw—the

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alveolar areas with the superimposed part of the maxillary sinus—are parts which come into existence as the molar crowns are developed and come into use. We do not maintain that the naso-palatine canal is absolutely fixed but the palatal area in its neighborhood is the part which is least altered during growth.

The growth of the palate bone, which also helps in the forward growth of the incisor area, is shown in Fig. 5*B*, the new bone being apparently added at its posterior as well as at its anterior margin. In Fig. 5*C* the growth of the vomer is shown; bone has to be laid down in the vomer, chiefly along its palatal or lower border, to keep time with the maxillary growth in front of the pterygo-maxillary fissure. The buckling of the septum of the nose is due, in part at least, to a lack of harmony in growth at the maxillary and septal sites. One point, shown in Fig. 5*C*, we would draw particular attention to: it is the importance of the transverse palatal suture—the suture in the bony palate between the maxillary and palatal elements. Bone is laid down in this suture at even a greater rate than at the posterior aspect of the maxilla. Growth at this suture has to keep time with the maxillary increase. In Fig. 5*C*, 18 mm. of new bone is shown as having been interpolated at the transverse palatal suture between the 5th and 25th years, three-fourths of the addition being made on the maxillary side of the suture. Thus it will be seen that the forward growth along line *F* involves a series of growth sites and demands the existence of a hormone or growth regulating system to coordinate the rate of increase at the diverse points of increase.

Here, too, we must call attention to a phenomenon which seems to have escaped observation hitherto—the process of absorption or remodelling which affects the nasal aperture and ascending nasal processes during the period of growth. In Fig. 5*A*, an anterior margin of the nasal aperture is seen to rise from the premaxillary element close behind the nasal spine at the 5th year, whereas in the adult it springs from the premaxilla just in front of the line of the naso-palatine canal. We have seen that the naso-palatine may be regarded as a fixed region; it is not the premaxillary element that has moved forward but the ascending nasal process which has been cut back. The process is identical to that seen in the ascending ramus of the mandible; while new bone is being laid down on the posterior border of the body of the maxilla, old bone is being absorbed from the margins of the pyriform or nasal aperture. As regards the ascending process of the maxilla— the process interpolated in the root of the nose, between the lachrymal behind and the nasal bone in front, new bone is laid down at all its margins (see Fig. 5*A*).

We here touch on the other series of the lines of measurements given in Table I, those along which growth is estimated in a vertical direction. Two of these we will refer to here in the briefest manner: the lines *A*, from nasion to sub-nasal point (Fig. 1), and *B*, from nasion to incisor crown (Fig. 1). At the 10th year the mean length of line *A* measures 42.9 mm.; by the 16th year, 6.2 mm. has been added; at full growth, the line reaches 53.2 mm. only 3.9 mm. being added in the later years of growth. The total

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increase from the 10th to the 25th years, is 10.3 mm.; the specimens represented in Fig. 2 indicate an increase of 14 mm. on line *A* from the 5th to the 25th years. A glance at Fig. 5*A* shows that this increase, so far as concerns the outer aspect of the face is almost entirely confined to the growth of the ascending nasal process; but there is, in the depth of the fact, a pronounced increase in vertical height of the body of the maxilla—the part enclosing the maxillary sinus. Also there is an increase in the vertical height of the septal and lateral walls of the nasal cavities, which is not easily estimated in the living (Fig. 5). New bone is being constantly formed in the maxillary floor of the orbit—in the roof of the maxillary sinus, leading to a thrusting downwards of the body of the maxilla and palate. As shown in Figs. 5, *B* and *C*, there is a corresponding growth on the vertical plate of the palate bone in the region of the spheno-palatine canal—and another along the lower border of vomer and vertical plate of ethmoid, leading to a downward and forward thrust of the palate. The vertical increase in the body of the maxilla and corresponding nasal parts is about 8 mm. from the 5th to the 25th years.

In line *B* another element becomes included—the growth of the alveolar part of the maxilla. It is not necessary to go into all the reasons which have led us to regard the alveolar part of the maxillæ—the part which lies below the level of the hard palate and forms the bony sockets for the teeth—as a distinct growth element, a plastic element regulated by its own independent growth system. The height or length of the face, particularly of the upper face, depends largely on the manner in which alveolar growth takes place. In Table I the length of line *B*, from nasion to central incisor crown, measures 64.0 mm. at the 10th year, 72.6 mm. at the beginning of the 16th, 76.7 mm. in adults; the fluctuations in height become greater the older the group of children examined. The difference between the lengths of the *A* and *B* lines represents the depth or height of the premaxillary part of the jaw; at the 10th year the premaxillary element measures 21.1 mm.; at the 16th year 23.3 mm.; in adult life 23.5 mm.; there is thus, after the eruption of the permanent incisors, only a slight increase in the height of the alveolar region of the maxilla. On the other hand there is a marked increase with the eruption of the permanent incisors (see Fig. 5*A*).

This is the most convenient point at which to introduce a common and remarkable conformation of the subnasal region of the premaxillary, one which is seen in quite 10 per cent of modern English skulls to the degree represented in Fig. 6. One palate, *A*, is of the primitive type, with wide, flat palatal plate, the alveolar borders being well apart and regularly developed. The other is a narrow contracted arched palate with high or deep alveolar margins. The two are superimposed so that the naso-palatine and palatal regions correspond. In the latter skull the nasal spine is very projecting and depressed, while the margins of the nasal or pyriform aperture have grown so as to separate the floor of the nose from the face by a sharp, deep ledge of bone. The alveolar margins in this skull are deeper than usual, particularly in the premaxillary region—the crown of the central incisor

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being 12 mm. lower than in the normal palate. This modern derangement of growth is almost confined to the alveolar element of the maxilla, leading to an increase of the "*B*" line by 10 or 12 mm. The length of the dental arch in profile, as seen in Fig. 6, is 6 mm. longer than in the normal palate. Thus increase in the direction of the line *B* may not be the result of a normal but of an abnormal growth. We shall see that with this abnormal increase in height of the upper face, there is a marked reduction in width measurements.

So far we have been dealing with sites of growth lying deep within the skull, situated on or near its mesial vertical sagittal plane. We now turn to the superficial sites and sutures concerned in the forward extension of lines *E* and *F* (Fig. 1). In Fig. 7 we have treated the trans-meatal axis as if it were a fixed and not a movable base; its movement does not alter the estimate of growth at the various sites. The first growth suture we direct attention to is that situated in the zygomatic arch, between the temporal and malar elements. This suture, it will be observed, lies directly over the pterygo-maxillary fissure in front of which new maxillary bone is added. It

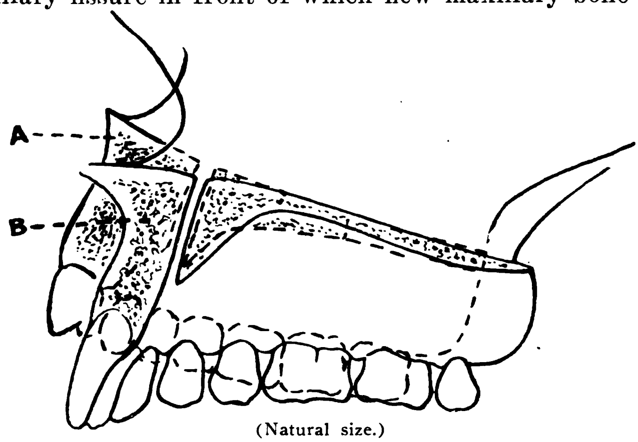

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Fig. 6.—Sagittal mesial section of a palate, showing a marked degree of narrowing or contraction (B), superimposed on a wide well-developed English palate (A). Both from male skulls.

will thus be seen that the temporo-malar suture is part of the great coronal system—including the coronal suture itself, the fronto-sphenoid (Fig. 3*C*) the spheno-ethmoidal (Fig. 3*C*), the pterygo-maxillary (Fig. 7*A*) and the transverse suture of the palate (Fig. 5*C*). The addition at the temporo-malar suture from the 5th to the 25th years is about 16 mm., being equal, in an antero-posterior direction to the amount laid down on the posterior region of the maxilla. In the growth of the face the rate of increase at all of these sites must be regulated by a coordinating mechanism.

At the malo-maxillary suture, although a great addition is made leading to increase of width of face, only a few millimeters are added so as to give a forward growth in the direction of lines *E* and *F*.

In Fig. 7*A* the addition made in the region of the pterygo-maxillary fissure between the 5th and 25th years is again shown, this time from the lateral aspect. The superimposition adopted in Fig. 7*A* brings out the alveolar growth at the eruption of the permanent incisors. The cutting back of

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the margin of the nasal aperture and the growth of the ascending nasal process, as seen on the lateral aspect of the face, are also brought out. We would direct special attention to the remodelling and backward movement of the malar process of the maxilla. In the 5th year it occupies a forward position in the flat face of the child; in adult years it has been shifted back by a process of remodelling—absorption on its facial surface with addition to its posterior or zygomatic surface. So far we have not met with any mention in published literature relating to this growth-transformation in the cheek region of the child's face.

As regards additions made to the vertical height of the face little need be said so far as concerns the parts shown in Fig. 7. The increase in height and breadth of the ascending nasal process of the maxilla has already been described; here we call attention to the growth of the corresponding process in the outer or lateral wall of the orbit—the frontal process of the malar.

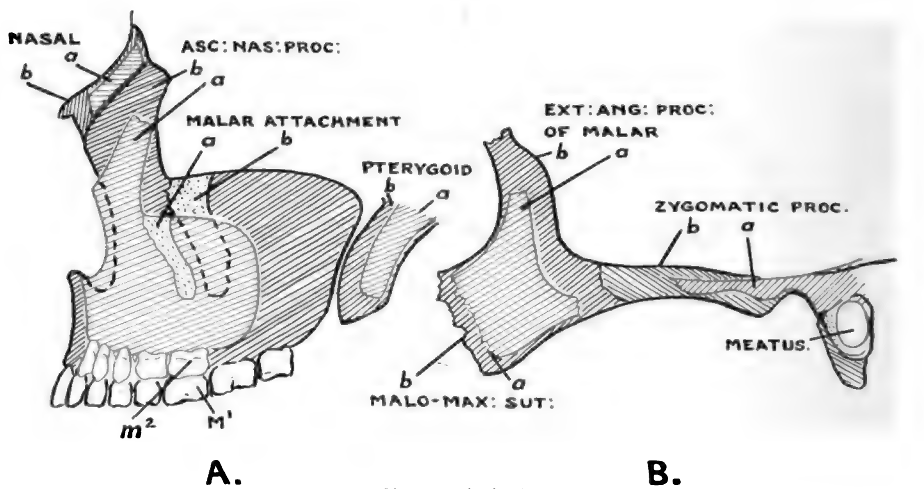

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Fig. 7.—A: Lateral aspect of maxilla and nasal bone of a child of five (a) superimposed on the corresponding parts of adult male skull (b). The area to which the malar applied is indicated by stippling. The pterygoid processes are also superimposed. B: Temporal and malar elements of the zygomatic arches of the same individuals superimposed to show the extent of growth at the temporo-malar and malo-maxillary sutures.

This process, between the 5th and 25th years has 11 mm. added to its vertical height (Fig. 7*B*). The addition made at the lower or masseteric border of this bone is relatively slight—3 or 4 mm. only, except in cases of contracted palate when the masseteric border occupies an abnormally low position. The increase in height at the alveolar border has been mentioned already.

In Fig. 8 a demonstration is given to show that the changes which occur in the maxillæ of acromegalics are of the same nature as those which occur in the faces of growing children. At the same time we cannot fail to note the influence of the pituitary body on facial growth; with a disordered enlargement of the pituitary we see all the growth changes of youth reawakened in the adult. In Fig. 8*A* the maxilla of a child of 5 years is superim-

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posed on the maxilla of an English adult male with well-developed face. The specimens are not those shown in Fig. 7*A*, but the changes due to growth are of the same nature although differing in detail. In Fig. 8*B*, the normal adult maxilla shown on Fig. 8*A* is superimposed on the maxilla of a man who had been the subject of acromegaly for over 15 years. The growth changes seen in Figs. 8*A* and *B* are clearly of the same nature and almost the same degree.

THE SUPRA-ORBITAL REGION OF THE FRONTAL AND ITS RELATIONSHIP TO THE FUNCTION OF MASTICATION

In everyday speech we count the forehead an essential part of the face but anthropologists have found it convenient to exclude it from the "anatomical" area to which they give this name. That the supra-orbital region

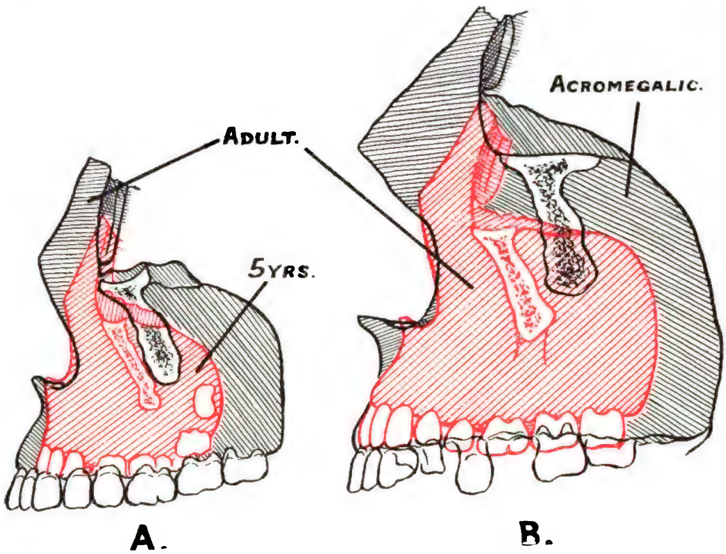

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Fig. 8.—A: Left lateral aspect of maxilla of child of five years superimposed on maxilla of adult Englishman. The specimens represented are not those shown in Fig. 7 although they illustrate corresponding age changes. B: The adult bone shown in Fig. 8A, superimposed on the maxilla of a man who was the subject of a chronic form of acromegaly. These specimens show the same kind and degree of difference as are depicted in Fig. 8A.

of the frontal is, like the cheeks and jaws, an essential part of the apparatus of mastication there can be no manner of doubt. These stout bony struts, the ascending nasal processes, go up between the orbits to rest the maxillæ on the mesial part and supra-ciliary regions, of the supra-orbital bony bar, the glabellar; on the outer or lateral wall of the orbit, the frontal processes of the malars prop the maxillæ on the external angular extremities of the supra-orbital bar.

In Fig. 9*A* is shown the frontal bone of a child, aged 5 years, seen on its anterior aspect and superimposed on an English adult with well-developed jaws, the superimposition being guided by internal or cerebral markings. It will be observed that the internal angular or fronto-nasal process of the

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frontal has new bone deposited on it to the thickness of 3-4 mm. from the 5th to the 25th years. The inter-orbital prop is increased in width or thickness by 6 or 8 mm. of new bone. New bone is also laid down on the supra-orbital margin. The changes at the outer end of the supra-orbital bar (Fig. 9*A*) are much more extensive and important. The external angular or malar process of the frontal is moved outwards by a process of growth during the 5th-25th year period to an extent of 15 mm., becoming stronger and more massive as it reaches its adult position. The process involved is the usual one—absorption on the mesial aspect of the process, deposition on its outer or lateral aspect. Thus the width of the supra-orbital bar, measuring about 78 mm. in the 5th year, becomes 30 mm. wider before the adult stage is reached in a modern robust-faced Englishman. These growth changes are correlated with others which take place in maxillæ and malars.

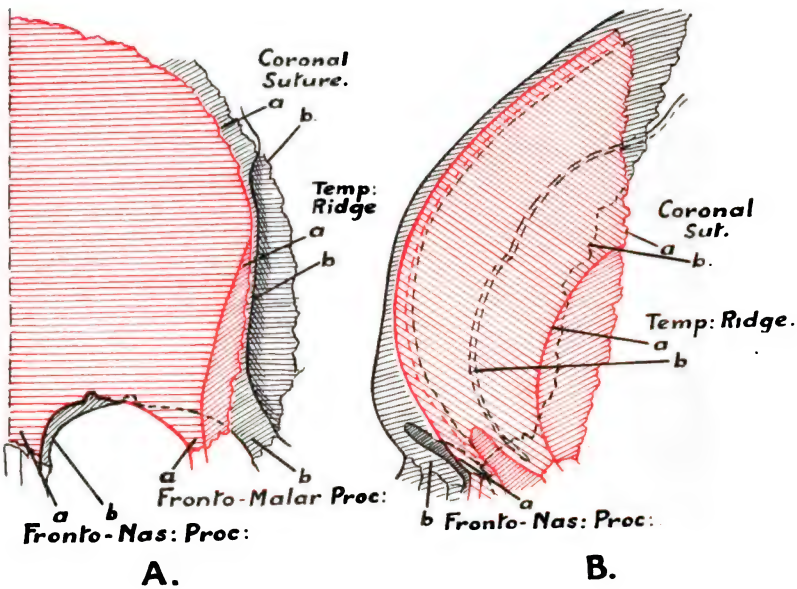

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Fig. 9.—A: The anterior aspect of the left half of the frontal bone of a child of five (a) superimposed on the left frontal of an Englishman with normally developed jaws (b). The bones are superimposed so that points on their inner or cerebral aspect coincide. B: The same bones seen in profile and superimposed according to internal markings.

Still more remarkable changes are to be observed in the frontal when mature and immature stages are viewed in profile (Fig. 9*B*). Here the bones have been superimposed so that points on their internal or cerebral surfaces coincide. The forward movement of the nasion and naso-glabellar region is again shown; the importance of this growth movement in adding to the *E* line has already been mentioned; in this case the movement in the 5th-25th year period is represented as 12 mm. We might have reproduced here superimpositions of the frontal bone of an acromegalic and normal man to show that the growth changes in the fully-formed frontal are of the same nature and degree as those represented in Fig. 9*B* in the youthful growing frontal bone. The profile tracings show that there is a forward movement of the malar

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process of the frontal during the later years of growth. This is correlated with the forward extension of the temporal muscle on the frontal bone throughout the 5th-25th year period. In Fig. 9*B*, the temporal line or ridge in the adult frontal lies 14 mm. in advance of the position occupied in the child. But besides these local changes in the supra-orbital bar and temporal ridges there is a rotatory movement of the frontal as a whole during the later years of growth. This rotatory movement, which varies much in its extent, is brought about by growth changes along the coronal suture. In the 5th-25th year period new bone is rapidly added to the upper part of the frontal bone—at the margin entering into the upper part of the coronal suture (Fig. 9*B*), while in the lower, the part of the suture covered by the temporal muscle, the opposite is happening: bone is being removed from the frontal edge, while the parietal edge extends forward. In this manner the lower or temporal segment of the coronal suture is advanced towards the forehead in the later years of adolescence. All of these frontal transformations are part of the mechanism of face and jaw growth. We have already drawn attention to the great coronal system of growth sutures—the "coronal complex." If growth of the upper face is abnormal the fault is to be sought for in some part of this complex—in the pterygo-maxillary part, temporo-malar, spheno-ethmoid, palato-maxillary, spheno-frontal, or in some part of the coronal suture proper. Normal growth implies that the process of bone growth all along this complex is proceeding in an orderly manner.

GROWTH IN THE MANDIBULAR REGION

We have now finished with the mechanism of growth in the upper face—at least so far as concerns its extension in a forward and vertical direction. Before proceeding to discuss growth in the mandibular region of the face we should like to express our conviction that the growth of the upper face is not only of much greater complexity than is mandibular growth but that the upper facial growth is the "pace-maker," as it were, to which the lower or mandibular mechanism has to adapt itself. There must be a mechanism for harmonizing growth at all sites where new facial bone is laid down but we suppose that an essential part of this mechanism must be one which adapts mandibular to maxillary growth. It is not necessary to point out that whatever the nature of this growth coordinating mechanism may finally prove to be, it is one very liable to be upset under modern conditions of life. Here, too, we may state our belief that in the lower jaw, just as in the upper, we have to distinguish the alveolar bone as constituting a separate growth element, differing in its reactions and nature from the supporting framework of bone on which the alveolar element is set. From remote times anatomists have known that this alveolar element is absorbed and completely disappears with the removal of the teeth. Its life and reaction depend on the presence of the teeth. Sir Frank Colyer has shown that in lower vertebrates the alveolar element in the mandible may be demarcated from the supporting element by sutural lines. In the adaptation of lower to upper teeth it is the alveolar bone element which reacts and brings about apposition. Alveolar

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spongy bone is peculiarly sensitive to the pressures and stresses brought to bear on it in the course of mastication.

Line *G* (Fig. 1) represents the distance of the mental eminence from the mid-point of the trans-meatal axis. In Fig. 10 are given the growth elements crossed by this line. The mesial aspect of the mandible of a child of 5 years has been superimposed on corresponding points of an adult mandible—the difference between the two representing the growth changes which are effected during the 5th-25th year period. The position of the mid-meatal axis is shown in each specimen. In the child, the "*G*" line measures 84 mm., in the adult, 132 mm.; the line, as indicated by these isolated samples, has been extended 48 mm. in 20 years. Of the 48 mm. thus added, 40 of them have been obtained by condylar growth—by the deposition of bone under the cartilage covering the upper and posterior aspects of the condyle. The remainder—some 8 mm. has been obtained by bone deposed on the lower and anterior aspect of the chin, thus deepening the mandibular symphysis and

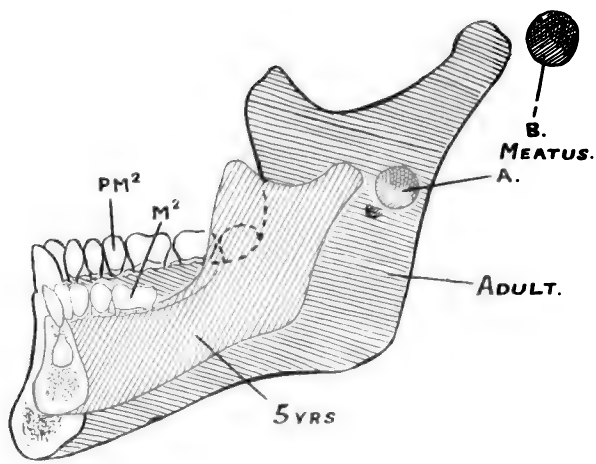

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Fig. 10.—Mesial aspect of mandible of a child five years (A) superimposed on corresponding points of adult male (same specimens as are represented in Figs. 2, 3, etc.).

extending it forwards. These calculations are based on the belief—by no means well supported, that there is no forward migratory movement of the mandibular alveolar element—the element which carries the mandibular teeth—but that the buds of the premolar teeth rise up and occupy the same relative position in the mandible as the milk molars did in the young child. The superimposition on Fig. 10 is based on the truth of this belief.

In Table I the mean distance of the mental or lower chin point from the mid-meatal point is given as 119.9 mm.; at the 10th year, 98.6 mm.; the chin is thus advanced 21.3 mm. in a forward and downward direction during the course of about 10 years. It is a notable fact that the advance is much more rapid after the 16th year than before it. While the advance is but 5.7 mm. between the 10th and 16th years, it is 15.6 mm. between the 16th and 21st. Table I also shows that the distance is much less stable—shows greater degree of fluctuation after than before the 16th year. It will be remembered

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that the same high variability characterized the later stages of maxillary growth.

In Fig. 11 other figures are given to illustrate the mechanism of mandibular growth. In Fig. 11*A* the mandible of a 5-year child is superimposed on that of a robust-faced Englishman, while in Fig. 11*B*, the same adult mandible is placed on the corresponding parts of the subject of acromegaly. In both figures the growth changes are seen to be of the same nature—of the same relative extent. These figures bring out the different behavior or reactions of the alveolar and of the supporting bone. In the acromegalic both elements react by growing, particularly the chin or supporting element which receives a pronounced enlargement. The special growth and prominence of the chin and supporting mandibular element in acromegalics are to be explained by the enlargement of the tongue and mouth musculature. The supporting framework of the mandible serves the uses of these muscles as well as the needs of the teeth. In the majority of acromegalics only the mandible

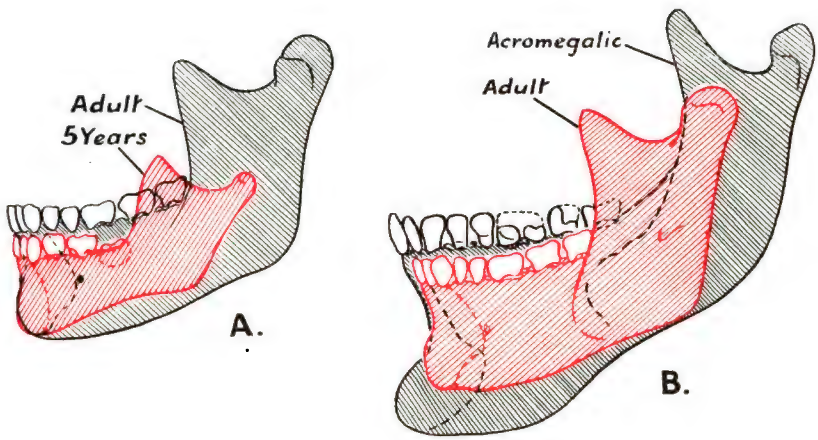

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Fig. 11.—A: Mandible of child aged five years, superimposed on mandible of adult male Englishman. These are not the specimens represented in Fig. 10. B: the adult jaw represented above, superimposed on the mandible of man who was the subject of acromegaly for over fifteen years.

responds to growth; the alveolar element of the maxillæ may not be affected; this we regard as due to the ease with which growth is set up under the condylar cartilage of the mandible.

The value of the length of the line "*G*," from a functional point of view, depends on the length of the face—the distance of the chin from the nasion. This is brought out by the two mandibles, both of Englishmen, superimposed in Fig. 12*A*. In the specimen labelled *b*, the distance of the chin point from the mid-meatal is 130 mm.; in *a*, the better-formed mandible, it is only 115 mm. The specimen "b" is from a man who had a narrow but deep palate, with long contracted face, the chin being 130 mm. distant from the nasion, whereas specimen "a" is from a man with a well-formed palate and facial length of 115 mm. In "b" it is seen that the angular or masseteric region of the mandible is ill-developed; the deep development of the alveolar

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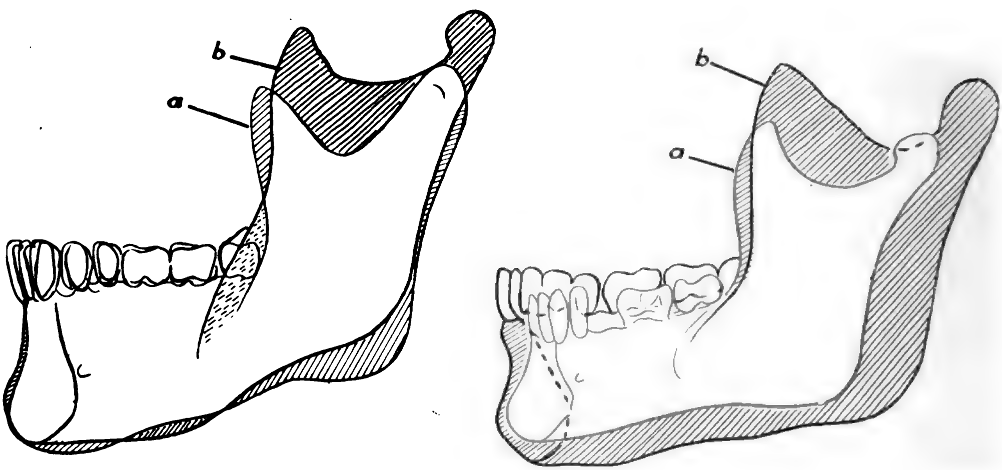
element of the upper jaw has led to the body of the mandible being pressed downwards, so that the body of the mandible is laid down at an open angle to the ascending ramus, the mandible has the appearance of having been laid down with the mouth kept in a gaping position. Here we have an increase in the *G* line due to an abnormality in the growth of the upper face. In Fig. 12*B*, the growth of a woman's and man's mandible are contrasted. The male outstrips the female in all three elements—the alveolar, supporting and muscular or ramal. As in acromegaly we see herein the influence of the hormone system on growth control.

We have said very little concerning the growth of the mandible; this is the only bone of the face in which the mechanism of growth has been studied in detail hitherto. Figures 10 and 11 illustrate where new bone is laid down and where old bone is removed. We would just add a word or two here as



A.

B.

(⅔ natural size.)

Fig. 12.—A: The mandible of a man with narrow, deeply arched palate (b) superimposed on a specimen from a man with normal palate (a). B: the mandible of a woman (a) superimposed on that of a man (b) to show the difference in development of all three elements of the mandible—alveolar, supporting, and muscular or ramal. Their difference depends on the growth influence of the sexual glands.

to the part taken by mandibular growth in adding to the length or vertical height of the face. In the symphysial region, as is illustrated in Fig. 10, 17 mm. is added to the vertical height of the face during the 5th-25th year period. In the samples chosen in Fig. 10, line *D* (see Fig. 1, Table I) measures 25 mm. at the 5th year and 42 mm. in the adult. Table I shows that the "*D*" line has a mean height of 35.8 mm. in the 10th year, 40.8 mm. in the 16th and 44.4 mm in the adult, the increase being 5 mm. in the 10th-16th year period and only 3.9 mm. in the 16th-21st year period. In the general development of the face the increase in height of the ascending ramus is of importance. From the sample shown in Fig. 10 one infers that the ascending ramus adds 28 mm. of new bone to its height in the 5th-25th year period.

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THE GROWTH-MECHANISM CONCERNED IN GIVING WIDTH TO THE FACE

So far we have been studying the sites at which new bone is laid down to give an extension of the face in forward and in downward directions; we now proceed to examine how the face expands in width—the most important direction to secure a normal development of the parts concerned in mastication. From observations made by one of us (A. K.) on prehistoric English skulls we are convinced that in a considerable proportion of the modern population of Britain there is a tendency for the face to become longer and narrower. This tendency is directly related to narrowing and arching of the palate. Bony matter is apparently laid down to about the same amount in these long contracted, hatchet faces as in the shorter, wider, more primitive prehistoric faces, but from some alteration in the mechanism of growth new bone which was formerly laid down to add to the width of the face is, in a large proportion of present-day people, deposited so as to increase the length at the expense of the width. With this reduction in width comes a pinching of the facial skeleton from side to side leading to the irregular projection of points situated in the middle line of the face—between the nasion above and the chin below (see Fig. 1).

The mechanism concerned in the increase in width of the supra-orbital part of the face—about 30 mm. in amount during the 5th-25th year period—has been illustrated in Fig. 9*A* and discussed in the text accompanying that figure. We shall proceed here to discuss the mechanism involved in widening the infra-orbital region of the face, the region which is made up of maxillæ, malars and nasals, and which enclose the nasal cavities. The hard palate is the central and essential part of this region of the face.

In Fig. 13*A* is represented from the front the infra-orbital part of the face of an Englishman with a well-formed palate—width between the outer margins of crowns of 2nd molars = 62 mm.—and the distance of the zygomatic arch from the mesial sagittal plane of the skull being 66 mm.—the bi-zygomatic width 132 mm. In the skull of the child, aged 5 years, the width between the outer margin of the second milk molars is 42 mm. while the zygomatic arch stands 49 mm. from the sagittal mesial plane—the bi-zygomatic width being 98 mm. In the samples chosen the bi-zygomatic width of the face increases from 98 mm. to 132 mm.—an addition of 34 mm. during the 5th-25th year period. Where is this new bone laid down? A glance at Fig. 13*A* will show that we believe the greater part is laid down on each side of the malo-maxillary suture; the addition made at this suture represents an increase of 10-11 mm. of new bone on each side, giving 20-22 mm. of the 34 mm. of total increase. There is new bone laid down on the lateral aspect of the malar and zygomatic arch giving an addition of 3 or 4 mm. on each side. It is to the third site we would particularly direct attention—the intermaxillary and internasal sutures. So far we have met no mention by previous investigators that they regarded the mesial suture of the palate, passing from nasal spine in front to the palatal spine behind, as an important growth suture. It is when we come to explain the widening of the nasal floor during the years of growth and the corresponding widening of the palate, and to ac-

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count for the growth movements which can be demonstrated, that we become convinced that new bone is laid down in the intermaxillary suture. As depicted in Fig. 13A we believe that the normal increase at this suture during the 5th-25th year period is about 8 mm. in width—4 mm. on each side. We shall come back to the point in discussing growth of the palate.

In Fig. 13*B* is represented the infra-orbital face of an Englishman with narrow, deeply-arched palate (the distance between the outer or buccal surfaces of the second molar crowns was 48 mm., between their inner surfaces 27 mm.), with long hatchet-face and fallen-in cheek bones. On his face have been superimposed the bones of a child 5 years of age, the same as are represented in Fig. 13*A*. There has been apparently no growth in the intermaxillary suture or on the lateral aspect of the zygoma after early childhood. There has been growth at the malo-maxillary suture but of an irregular nature, particularly on the malar side of this line. The malar instead

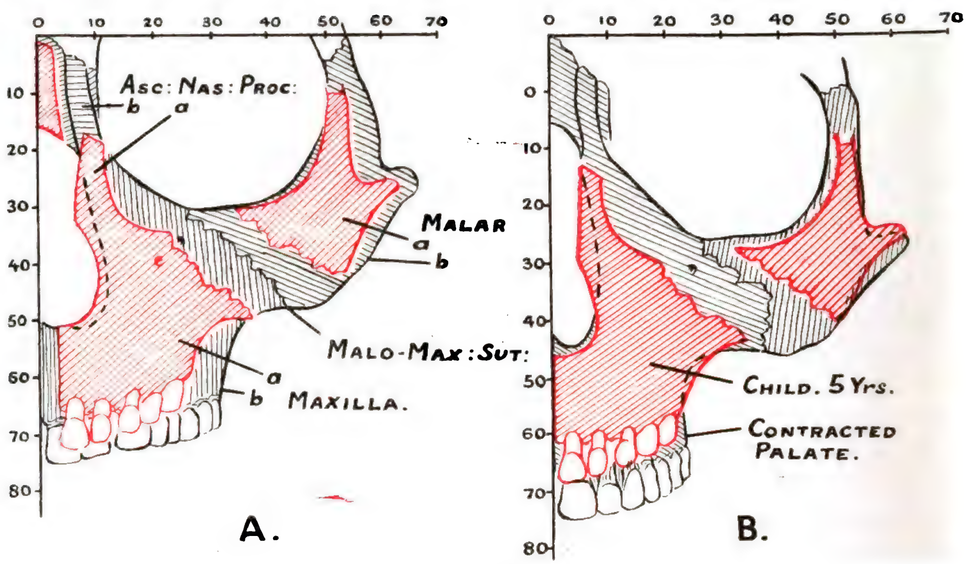

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Fig. 13.—A: The left maxilla malar and nasal bones of an Englishman with wide palate and robust, symmetrically developed face, represented on their anterior aspects. On these adult bones have been placed those of a child of five years, superimposed so as to bring out the areas of bone growth during the fifth to twenty-fifth year period. B: The same bones of an Englishman with narrow, deeply-arched palate, long hatchet face. On them have been superimposed the same child's bones as are represented in Fig. 13A.

of expanding in a lateral direction has tended to spread in the direction of the pull exercised on it by the masseteric muscle. The alveolar element in place of expanding laterally has spread downwards, in a vertical direction. The ascending nasal process of the maxilla and the frontal process of the malar are particularly long, giving the modern orbit its great depth. We have here a marked disturbance in the normal process by which the face expands in a lateral direction.

In Fig. 14 the process of norml growth of the face is contrasted with that seen in acromegaly. In Fig. 14*A* is represented the growth changes during the 5th-25th year period, but in this case the child's maxilla has been

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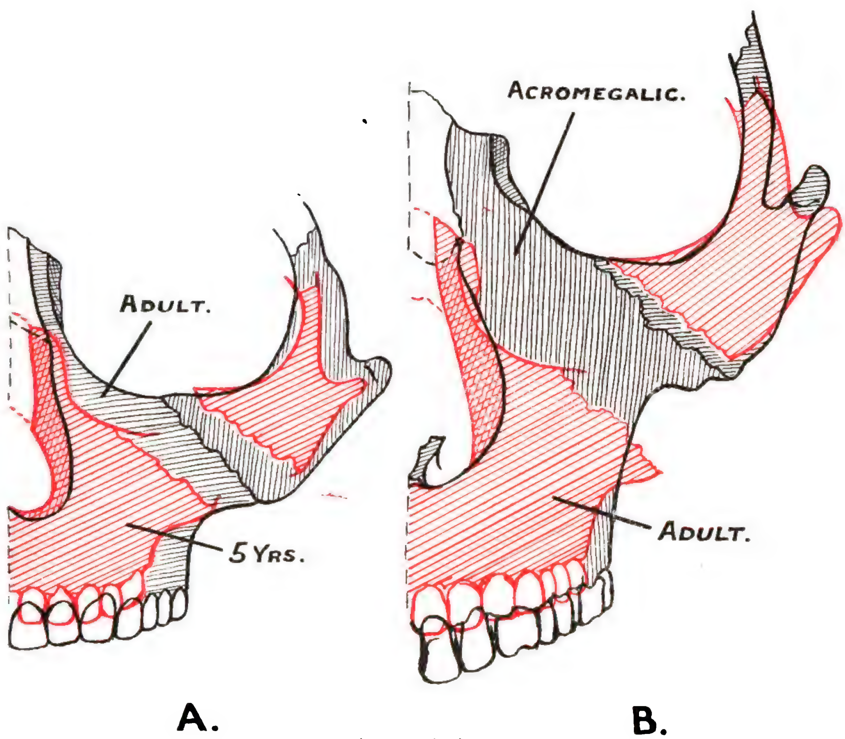
superimposed as if no growth took place at the intermaxillary suture. In Fig. 14*B* the bones of the adult shown in Fig. 14*A* have been superimposed on the infra-orbital face of a man who was the subject of acromegaly for 15 years. The mechanism of growth which is seen at work is the same as that seen in youth, only of an irregular kind. The irregularities seen in Fig. 14*B*, so far as their nature is concerned, are not unlike those which affect the contracted face, represented in Fig. 13*B*.

STUDY OF FACIAL GROWTH AS SEEN ON THE BASE OF THE SKULL AND PALATAL ASPECT OF THE FACE

In the study of the growth of the face the approach which gives the most instructive results is by a route not possible in the living—only in dried



(¾ natural size.)

Fig. 14.—A: The infra-orbital part of the face of an Englishman (A), with bones of a child of five years superimposed to compare with the infra-orbital part of the face of a subject of acromegaly. B: on which the bones of a normal adult have been superimposed.

macerated skulls. The approach is that depicted in Fig. 15 where the basal aspect of the palate is drawn—the drawing being made on a place represented by the premolar and molar parts of the alveolar margin of the palate. The zygomatic arches are also included; so are the maxillæ. The post-glenoid spine, which marks the posterior limit of the masticatory area on the base of the skull, is taken as a base line, from which the forward movement of parts is estimated during the growth of the face (line shown in Fig. 15). In Fig. 15*A* the state of matters is that reached at the completion of the milk

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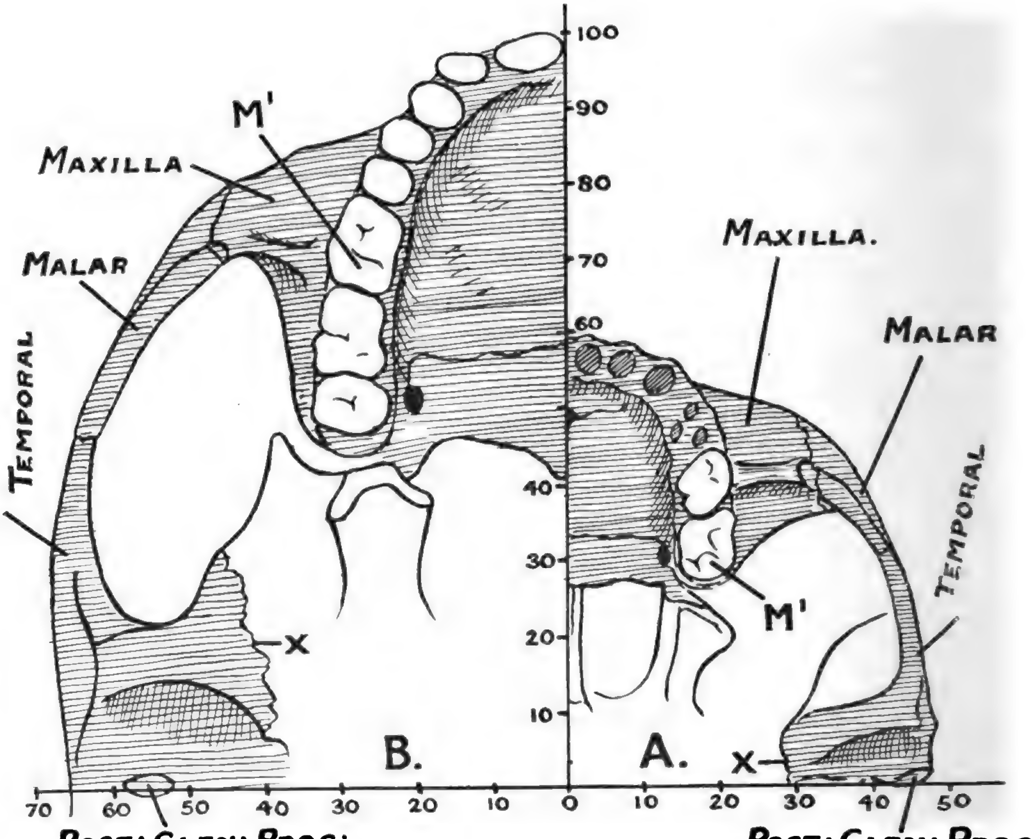
dentition and during the formation of the first permanent molar in the 4th year of life. The problem we have to solve is: how does a palate such as that represented in Fig. 15*A*, become the adult palate depicted in Fig. 15*B*? The drawing shows that in the 4th year the incisor alveolar margin lies 60 mm. in advance of the post-glenoid base line; in the adult it is 100 mm. in advance. In the 4th-25th year period this part of the palate is advanced 40 mm. What is the mechanism involved? In the child's face (Fig. 15*A*) the zygomatic arch is 47 mm. from the mid-line; in the adult it is 68 mm., an increase of 21



(Natural size.)

Fig. 15.—A: The left half of the palate and zygomatic arch of a child in which the milk dentition is completed and the crown of 1st permanent molar is forming; about four years of age; drawn on the plane of the alveolar margin. The base line crosses the postglenoid spine. B: the right half of the palate and supporting zygomatic arch of an adult Englishman, with well-developed palate and jaws. The base line CC passes through the post-glenoid spine. In the adult, the post-glenoid spine forms the anterior boundary of the meatal passage; it lies 4 mm. in advance of the mid-meatal point.

mm. How is this extension obtained? Further, a very important point, the outer edge of the great wing of the sphenoid, the spheno-temporal suture (*X*, Fig. 15) just mesial or internal to the temporo-maxillary joint is 27 mm. distant from the mid-line in the child but it is 38 mm. distant in the adult. The growth of the face is attended by a pushing outwards of the region of the temporo-maxillary joint—the movement depending on the growth of the great wing and body of the sphenoid.

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In Fig. 16 a, b, c, an analysis is given of the sites at which new bone is laid down from the 4th to the 25th year. In Fig. 16 the maxilla and the palate represented in Fig. 15*A* (a younger stage than has been used in previous illustrations) have been superimposed on the adult maxilla and palate represented in Fig. 15*B*. As near as possible the alveoli of the milk teeth have been placed over the corresponding alveoli of the adult palate. To obtain this superimposition it will be seen that it has been necessary to assume a growth at the intermaxillary suture; as previously stated we believe that about 4 mm. of new bone is added at each side of this suture during the eruption of the permanent dentition. Besides there is, or should be, also a lateral and forward growth of the alveolar element of the maxilla; 21 mm. of new bone has been added to the alveolar arch to carry the sockets of the 2nd and 3rd permanent molars. The maxillary palate has been extended backwards at the transverse palatal suture, 11 mm. of new bone being thus added. It will also be seen from Fig. 16*A* that the malar or cheek part of the body of the maxilla has been extended laterally 10 mm. by growth at the malo-maxillary suture, and at the same time has been moved backwards by remodelling, so that the malar process, instead of lying in line with the 2nd milk molar, comes opposite to the first permanent molar. The forward extension of the palate is largely the result of interpolation of new bone on the maxillo-palatal part of the great coronal sutural complex.

In Fig. 16*B*, the growth of the horizontal plate of the palate is depicted; if the posterior palatine canal may be regarded as fixed during growth then addition is made to both anterior and posterior borders of the horizontal palatal plate.

During the eruption of the permanent molar teeth the temporo-mandibular area of the base of the skull is revolutionized—particularly during the later stages of dental eruption. Not only are the articular surfaces altered in shape and extended in size, as shown in Fig. 16*C*, but new bone is added at both margins of the temporal bone; on its mesial side, about 6 mm. of new bone is added in the spheno-temporal suture (see Fig. 16*C*) and a like amount at its lateral border. All the time, too, the temporo-mandibular region is being pushed laterally by increase in the width of the sphenoid bone—by new bone being laid down on the sphenoid side of the spheno-temporal suture (see Fig. 15). There is no need to again draw attention to the extensive interpolation of new bone in the temporo-malar suture of the zygomatic arch, nor to the growth of the malar itself. Thus it is seen that the 40 mm. which the incisor part of the maxilla moves forwards from the 4th to the 25th years, depends on new bone being laid down in the temporo-mandibular region of the temporal bone; to new bone interpolated in the zygomatic arch, to new bone interpolated at the posterior end of the alveolar arch and transverse suture of the palate and to new bone deposited on the anterior or labial aspect of the alveolar margin of the maxilla.

Fig. 17. That the narrow deeply-arched palate is not a single defect in an otherwise well-developed face, but part of the failure in the general growth of the face, will be seen from the comparison made in Fig. 17. Here

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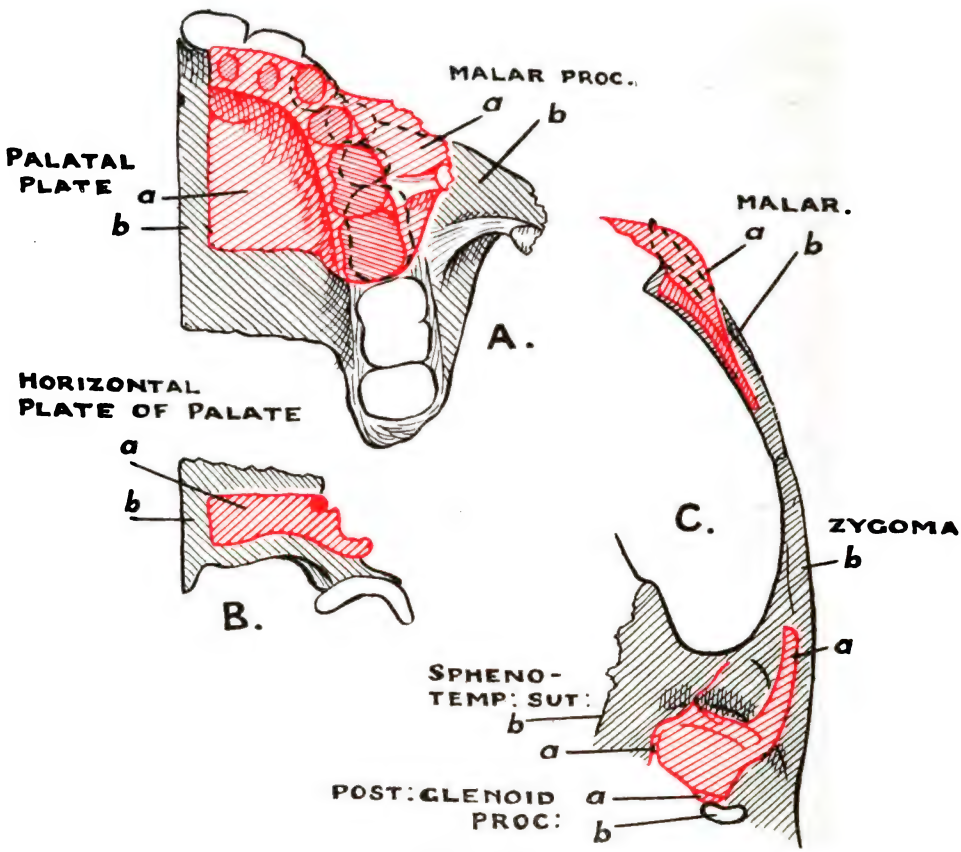
we have placed an exact drawing of the right half of the temporo-palatal region of a prehistoric Englishman, one with well-spread palate and a full and robust development of jaws, as was the rule in the prehistoric Britons. On this well-developed ancient face we have placed the corresponding parts —drawn like the first on the alveolar plane—of a modern Englishman with long narrow face, contracted palate, and imperfectly grown jaws—a representative of the "adenoid faces." The molar teeth of the modern skull will be seen to fall 5 mm. inside the corresponding teeth of the ancient skull; it is so also with the canine and incisor teeth. We regard the



(Natural size.)

Fig. 16.—The palates shown in Fig. 15 taken apart, and the individual parts superimposed. (A) The palate, alveolar margin and maxilla of "a," a child aged four years, superimposed on the same parts of the adult "b." (B) The palate bone of the child superimposed on the palate bone of the adult, the orientation being guided by the position of the posterior palatine canal. (C) The temporo-mandibular region with the parts of the zygomatic arch superimposed on the corresponding parts of the adult.

defective or diminished spread of the palate in the modern skull as being due, in the main, to a failure of bone growth along the midline suture of the palate—the intermaxillary suture. The lower end of the malo-maxillary suture, marking the anterior limit of the origin of the masseteric muscle, lies 10 mm. further outwards and forwards in the ancient than in the modern skull. The lateral spread of the ancient zygomatic arch is 11 mm. greater than in the modern. In the region of the temporo-mandibular joint we see

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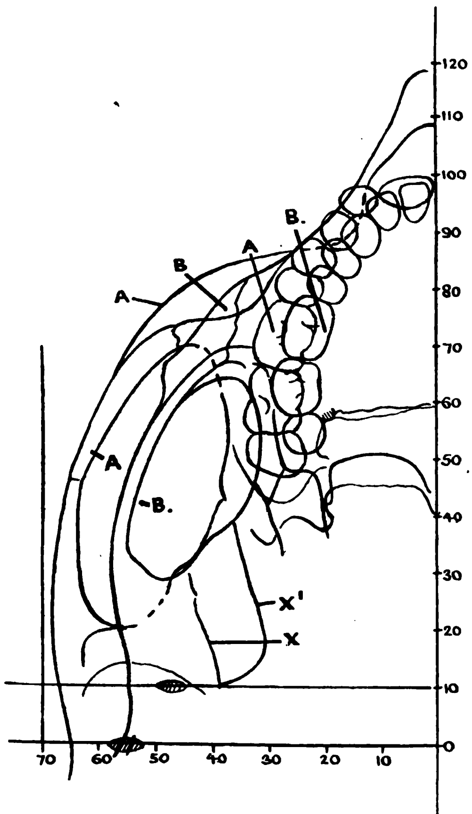
even greater differences between the growth of the modern and ancient skulls. Mention has already been made of the growth of this region and its migration outwards or in a lateral direction owing to the expansion of the great wing of the sphenoid in the later stages of molar eruption. It will be observed that the outer edge of the great wing of the sphenoid on the modern skull (Fig. 17 x) lies 8 mm. internal to and in advance of the corresponding point (x) of the ancient skull. Further it will be observed that the post-glenoid spine in the modern skull lies 8 mm. in advance of and 8 mm. mesial or internal to the post-glenoid spine of the ancient skull. This indicates



(¾ natural size.)

Fig. 17.—Left half of temporo-maxillary region of skull of prehistoric Englishman (A) with primitive, well-developed palate and jaws, drawn on the plane of the alveolar margin. On this primitive palate is placed that of a modern adult Englishman (B) in which the face was narrow and elongated, the palate contracted and the jaws imperfectly grown.

that the forward movement of the whole palatal bony scaffolding of the modern skull has been arrested and that the naso-pharyngeal space has been restricted by a failure in the mechanism of facial growth.

Further evidence as to the nature of the defective growth of the face so common among modern Englishmen and particularly Englishwoman will be gleaned from an examination of the careful drawings reproduced in Fig. 18. On one side of that drawing is depicted the zygomatic arch, maxilla and palate of an Englishman who was the subject of acromegaly for many years

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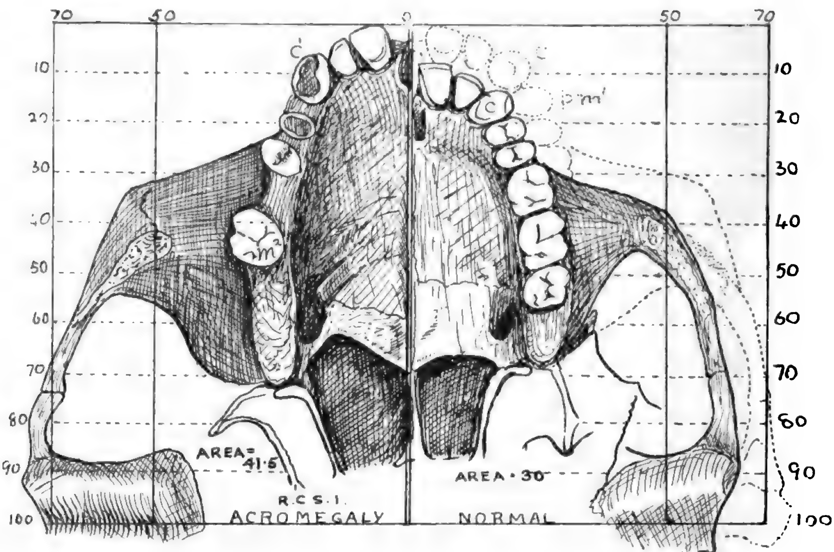
—one of these cases where overgrowth affected the maxillæ as well as the mandible. Side by side with this drawing is set the corresponding parts of a well-developed skull of a modern Englishman. The difference between the acromegalic specimen and the normal one is of the kind shown in Fig. 17 in which the ancient, well-developed and modern contracted palates are compared. The differences are those which result from an arrest or a disorder of the mechanism of growth. With the disordered enlargement of the pituitary we have a disorderly growth of all the parts concerned in mastication.

SUMMARY OF RESULTS

In this paper we believe we are opening out a new chapter in our knowledge pertaining to the mechanism which transforms the face of the child into



(⅔ natural size.)

Fig. 18.—Right half of the temporo-palatal region of a subject of acromegaly, compared with the corresponding region of a normally developed skull of a modern Englishman. Round the drawing of the normal palate are shown in stippled lines the dimensions of the acromegalic palate and zygomatic arch.

that of the adult. We have merely dealt with the general nature of the growth-machinery involved; we are fully conscious that a long and laborious investigation is needed to elicit the exact details relating to the changes which occur at each year of a child's life; further observations on both living and dead are needed. But we have shown enough to convince everyone that the so-called "adenoid face," the narrow, deep palatal arch, the irregular eruption of teeth, are not due to a simple mechanical cause such as the presence of enlarged tonsils, or of adenoid vegetations in the respiratory tidal way. We are dealing with an arrest or a disturbance of the elaborate machinery which underlies facial growth. We have produced evidence showing that this mechanism is influenced by the functional state of the pituitary and of the sexual organs. We regard enlargement of the tonsils, the growth of adenoid vegetations in the naso-pharynx, and disordered or irregular growth of the

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jaws and face as manifestations of a single pathological state. What the exact nature of this underlying pathological condition may be we are not yet in a position to decide, but when we keep in mind the close relationship there is between bone-formation and bone-growth, and the action of the glands of internal secretion on the one hand and the frequency with which a hypertrophy of the lymphoid system is accompanied by a defective formation of bone on the other, it is not difficult to believe that irregularities of the jaw and the development of adenoids may result from a nutritional disturbance. The explanation may come through the kind of research now being conducted by Colonel McCarrison, who has shown that a diet deficient in certain vitamine constituents will affect the normal working of the hormone growth systems of the body. Vitamines appear to act directly on the glands of internal secretion. We suspect that the defects which are so frequent in the growth of the English, or rather Nordic, face may ultimately prove to be the result of some deficiency or error in the dietary on which our infants and youths are reared. No doubt, too, our modern dietary is of a kind which leaves teeth, jaw and muscles of mastication imperfectly exercised. The physical stimuli which are necessary for the normal growth of bone are missing. This, too, may be a factor in gnathic degeneration.

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THE IMMEDIATE TORSION OF INCISOR TEETH*

F. Bocquet Bull, L.R.C.P., M.R.C.S., L.D.S.

I AM reading this paper to you this evening with the hope that perhaps the results of eight cases of irregular teeth treated by immediate torsion in the Dental Department of Guy's Hospital may be of interest to you.

The practice of immediate torsion dates back as far as I can find for many years. Tomes in his "Dental Surgery" mentions a case reported in the "Transactions of the New York Odontological Society for the year 1875" of a right supernumerary tooth twisted by immediate torsion. The details of the operation of immediate torsion are given by him in his "Dental Surgery," as well as by Colyer in his "Injuries and Diseases of the Teeth." Bennett's "Science and Art of Dental Surgery" also gives valuable information on the subject.

In this country the operation of immediate torsion has been practiced by Dolamore and Spokes. Apart from these surgeons, I have not been able to trace others who have adopted it on any extensive scale, and apparently it is but little practiced, if at all, at the present time.

A rotated tooth may be moved by one of two methods, viz., by slow torsion or immediate torsion. There may be many of you here tonight who would say, "Why take the risks of the operation of immediate torsion, viz., killing the pulp, fracturing the tooth, causing necrosis of the bone around the tooth with subsequent loss of the tooth, when you can obtain the requisite result by slow torsion without any risk whatsoever?" To those of you I would say that, if your cases are selected carefully, the risks alluded to are largely illusory, and, on the other hand, the time and labor saved both to you and your patient are very considerable.

The tissues involved are numerous, consisting as they do of the pulp, dentine, cementum, periodontal membrane, bone, and to a minor extent, the overlying gum. Of these, the part most likely to be damaged, as one would expect, is the all-important one, the pulp.

Modus Operandi.—It having been decided that the tooth under consideration should be rotated by immediate torsion, and here let me state that, as in all other operations, the slight risk in connection with it should be pointed out to the parent or guardian, two sets of models should be made, one for the purpose of record, and the other for the purpose of splint-making.

The making of the splint needs careful consideration, as upon this greatly depends the success or otherwise of the operation. Personally I like to make an anchorage of two teeth if possible, although one tooth will suffice. The anchor teeth need not necessarily be upon both sides of the tooth to be rotated. The first step is to carefully remove the tooth to be rotated from the model

*Read before the British Society for the Study of Orthodontics, November 7, 1921.

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by cutting around it at the cervical margin and then gently levering it off. Having done this it is replaced in the desired position on the model by means of hard wax.

A very thin wax matrix is made covering about two-thirds of the crowns of the teeth to be splinted. Great care should be taken not to run the splint up between the sides of the teeth, or otherwise the splint will be difficult, or almost impossible, to adjust. Further, the matrix should be cleared or thinned enough on the palatal surface to prevent interference with the articulation.

The matrix is then invested in the usual way and cast in Ash's silver-copper alloy. This runs very easily, need not be gilded, and has no deleterious effect on oral tissues.

All the cases that I have records of to show you this evening were performed under ethyl chloride. This anesthetic, so suitable for children, gives an ample anesthesia for the operation, including the fixation of the splint. It is advisable to have present at the operation an assistant to prepare the cement and insert it in the splint, so that after the tooth is rotated the splint is ready for handing to the operator. The instrument that has been used in all these cases is a blunt pair of upper incisor forceps.

The site of operation having been prepared by means of painting with a 3 per cent solution of tincture of iodine, the patient is anesthetized. When the patient is ready, the alveolus is held firmly as for the extraction of a tooth, and the instrument applied. Frequently the instrument has to be passed up under the gum margin in order to reach beyond the convexity of the teeth, for in many cases the tooth has not erupted sufficiently for this convexity to be exposed. As soon as the instrument is sufficiently far up the crown of the tooth for a firm hold to be maintained, torsion is commenced. In many cases torsion alone will not move the tooth, and the inward and outward movement used in extraction, only with more care, is necessary as an additional help. While this part of the operation is proceeding, the assistant should be mixing the cement (in all cases Ames' oxyphosphate of copper has been used) so that at the critical moment the splint is ready to be handed to the operator to fix. The teeth should be cleared of blood as much as is possible, although from the point of view of the security of the splint on the teeth this does not seem to matter much. At first I endeavored to remove all traces of blood, and even dry with alcohol, but not only was this almost impossible, but, as I have just said, unnecessary. The splint should be forced well on the teeth in order to adjust the rotated tooth to the position recorded on the corrected model. All excess of cement should be carefully removed, and the splint held in position while the patient is recovering from the anesthetic. Usually two to three minutes is a long enough period for the splint to be maintained in position, as at the completion of this period of time the patient has ceased the struggling sometimes associated with recovery, and the cement is hard.

After-treatment.—It is advisable to see the patient on the following day in order to ascertain that no undue pain is being suffered, and again about

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the fourth or fifth day. After this, it is unnecessary to see the patient again for some weeks, if promise can be obtained that immediate notice will be given if any trouble whatsoever is experienced. All the present cases were seen as nearly as possible once a fortnight, but this was for the purposes of x-raying, and to gain experience of their progress. For the first few days it is advisable to prescribe a mouth-wash, chiefly for the purpose of keeping the mouth, and particularly the neighborhood of the splint, free from foreign material. For this purpose hydrogen peroxide of a 5-volume strength has been used.

Removal of the Splint.—The splints have been removed after an interval of about three to four months. It must be borne in mind that, apart from the use of the splint to immobilize the tooth rotated, it serves also as a protection to the tooth during the process of mastication.

Just a few more words before I commence to show you the slides illustrating the cases. Those of you who in your private practices are able to carefully preserve your models, films and records may think it perhaps rather surprising that the cases that I show tonight are incomplete to a small degree regarding these important accessories. I will ask you to bear in mind that these are hospital cases, and that models, films and records cannot be carefully locked away so that the operator can be certain that he is the only individual to use them, but that they have to be so kept that operator, house-surgeon, dressers and others can have access to them at any time, and then not in a private consulting-room, but in a room populated by perhaps 200 to 250 people, including those well-intentioned but sometimes annoying people, the hospital cleaners.

The foregoing is a brief apology for my inability to show you the slides of one or two models and films that have disappeared during the period over which these cases extend.

Case 1. A boy, Horace L., age 8 years. On October 23rd, 1920, immediate torsion of |1 took place. Condition after operation was always satisfactory. Previous to operation a plate had been inserted to retract |2 in order to make more room for rotation of |1. The tooth was tested on November 3rd, 1921, and a very good response to heat was obtained. A radiogram of the tooth taken on October 8th, 1920, showed a well-opened apical foramen, and a radiogram taken on July 6th, 1921, shows the foramen almost closed.

Case 2. A girl, Enid P., age 11 years. This patient had previously had an operation for a cleft palate. She was a very difficult patient to deal with owing to marked intolerance to anything placed in her mouth. The |1 was rotated and outstanding, and the |2 instanding with but little space between |1 and |3. The |2 was extracted and |1 was rotated by immediate torsion on February 12th, 1921, at the age of 12 years, 1 month. The splint came off on February 26th, 1921, and there was slight hemorrhage from around the tooth. On March 9th, 1921, the patient complained of slight pain in the region of operation, but this had disappeared a fortnight later. The tooth was tested later, but was found to be dead. For the reason mentioned above no films of this case were taken.

Case 3. A boy, Reginal B., age 7 years, 2 months. Both central incisor teeth are abnormally large. Immediate torsion of |1 took place on December 29th, 1920. On January 22nd, 1921, the patient appeared at the hospital with the splint broken; this was refixed on January 27th. From May 1st until the middle of June the patient was in hospital with scarlet fever. On July 29th the splint was removed. On September 1st the tooth responded

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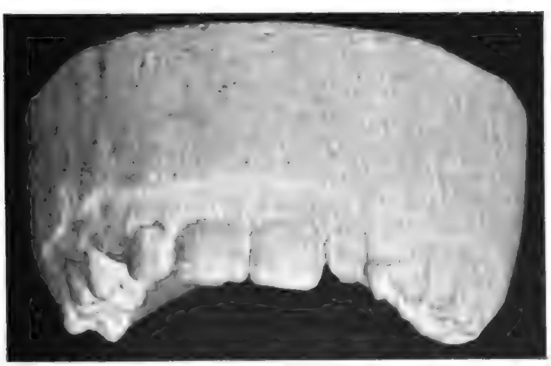
1 2

3 4

Case 1.
(The cross indicates the tooth moved.)



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well to both heat and cold. A radiogram taken on November 1st, 1920, showed small development of the root, and subsequent radiograms taken until his discharge showed very well the gradual development of the root.

Case 4. A girl, Violet H., age 10½ years. An upper left lateral incisor was rotated on November 18th, 1920. A radiogram taken previously showed a well-open apex. On November 3rd, 1921, the tooth was found to respond to heat, but not quite as markedly as the upper left central incisor. Radiograms taken subsequently to operation show gradual development of the root.

Case 5. A boy, Charles S., age 9 years. An upper left central incisor tooth was rotated on April 23rd, 1921. The root was only partially developed. On July 12th, 1921, the splint was removed. On September 15th, 1921, the tooth was found to respond well to cold, but slightly to heat. Subsequent radiograms show gradual development of the root.

Case 6. A boy, Eric T., age 12 years. An upper left lateral incisor was rotated on April 23rd, 1921. The tooth had a slightly open apex. On testing five days later no thermal response was obtained. On August 4th, 1921, the splint was removed. On November 5th, 1921, the tooth was again tested for thermal response but none was obtained. The tooth was slightly loose, and an abscess had pointed on the gum above the tooth. Radiograms taken subsequently to the operation showed the following changes: July 2nd, 1921, a lighter area around the apex of the root denoting bone absorption, which was not shown on a radiogram taken on July 16th, 1921, but which is shown on a radiogram taken on November 5th, 1921.

Case 7. A girl, Monica L., age 9 years. An upper left lateral incisor was rotated on May 21st, 1921. Great difficulty was experienced in keeping the tooth in correct position previous to splinting. The splint was removed on September 27th, 1921, when the tooth was found to be slightly painful on pressure. A counterirritant was applied to the gum, and two days later pain had disappeared. On November 3rd, it was found that the tooth responded to heat, but not quite so well as the adjacent tooth did. The radiogram taken before operation showed a well-open apex, and those taken subsequently showed the usual development.

Case 8. Charles S., age 9 years. The upper right central incisor tooth was rotated and brought forward on June 18th, 1921. On November 3rd, 1921, the splint was removed, and very well-marked thermal response was obtained. The radiogram taken before operation showed a well-open apex, and those taken subsequently showed its gradual closure.

Table of Cases

Patient	Age	Tooth	Condition after operation (figures refer to months)	
H. L.	8	|1	12	Very good.
E. P.	12	|1		Dead.
R. B.	7 2/12	|1	8	Very good.
V. H.	10 6/12	|2	12	Responds to heat, but not quite as much as |1 does.
C. Sh.	9	|1	5	Responds well to cold, but slightly to heat.
E. T.	12	|2		Dead.
M. L.	9	|2	6½	Responds to heat, but not quite as much as |1 does.
C. Sd.	9	1|	5½	Very good.

The conclusions that I think may be drawn from these cases are:

(1) That an incisor tooth with a well-open apex may safely be rotated by the immediate method; and

(2) On the contrary, a tooth the root of which is fully or nearly fully developed should be rotated by the slow method.

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In conclusion, gentlemen, I should like to render my thanks to Mr. H. M. Worth, the Dental Radiographer at Guy's Hospital, and also to my House-Surgeon, Mr. V. L. Sunderland, both of whom have given me invaluable aid in the preparation of this paper.

DISCUSSION

The President congratulated Mr. Bocquet Bull upon the very interesting series of models and of radiographs which he had shown. The subject of the immediate movement of misplaced teeth was one which, as Mr. Bocquet Bull said, had interested a certain number of dental surgeons for many years; in fact, he thought one might go back even further than the author of the paper had suggested, for one found that no less an authority than the French dentist Fauchard left it on record that in 1728 he performed the operation of luxating an incisor tooth into line. Some years ago he (the President) was encouraged to do the operation known as alveolotomy through the successful efforts of Mr. Sidney Spokes and Mr. Dolamore in the immediate movement of teeth, and whose work was published in the Transactions of the Odontological Society many years ago. Alveolotomy was different from the operation of immediate torsion to which Mr. Bocquet Bull had referred; but the dangers and risks involved in the immediate method were perhaps somewhat similar to those which the author had mentioned; though for his own part he was of opinion that the risk of failure in alveolotomy was less than with immediate torsion. It would be remembered that the term ''alveolotomy'' was given by Mr. Dolamore in the year 1899, when he read his paper on the subject before the Odontological Society; the operation consisted in dividing the bone on either side of the misplaced tooth and in bringing that tooth into the normal line of occlusion. Mr. Bocquet Bull had referred to several of the important points to be borne in mind when undertaking such an operation as immediate movement, and he (the President) wished to emphasize the great importance of asepsis in such cases—asepsis, that is, as far as it was possible to obtain it for operations in the mouth. The value of radiographs both before and after treatment was recognized by all who adopted these methods. In the operation of alveolotomy he had used the small alveolar saws which could be purchased from the depots, and for the movement of the tooth itself the forceps known as Grever's forceps. With those forceps he had employed a rubber pad to safeguard the tooth, so that it might not be forcibly moved out of its socket. He wished to ask Mr. Bocquet Bull whether he used some sort of pad as a protection against this mishap. Mr. Bocquet Bull had referred to one particular case in which that tendency had arisen. It had been suggested by some authorities that bony union did not occur in the maxillary bones after fracture; but for his own part he could not understand why the structure of the maxilla should be an exception to other bony structures. Of course, if the periosteum was torn and was allowed to remain between the fragments, then that would prevent union. He thought that the subject which Mr. Bocquet Bull had introduced was a field of surgical treatment of which the possibilities had not yet been exhausted and one which was worthy of further investigation.

Mr. F. St. J. Steadman, in thanking Mr. Bocquet Bull for his paper, said that he felt very serious doubt as to whether immediate torsion was justified or not. Certainly in cases over ten years the percentage of dead teeth that had been obtained was too high. Dead teeth, to his mind, were a very serious matter indeed, and in one case quoted this evening in which, after some months, Mr. Bocquet Bull removed the splint and found the tooth still tender, in his (the speaker's) experience, that tenderness remained. If the tooth remained tender for months while the splint was on, that would mean that the patient would subsequently avoid biting on that tooth, and peridontal disease would be set up. In that case he would feel justified in removing the tooth even after the trouble that had been taken to put it into the correct situation. Then with regard to the earlier cases, the driving of forceps up underneath the gum, right through the attachment of the gum to the alveolus into the dental ligament was an undesirable thing. The dental ligament would have been damaged, and sepsis liable to set in there; therefore he did not think the risk was justified. The tooth could be got into its normal situation by the slow method, and he felt

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that if it were intended to do the operation by the quick method, one should have exceptional reasons for so doing. The risk was so great that, while thanking Mr. Bocquet Bull for his paper, he personally would not follow the practice which had been indicated.

Mr. George Northcroft said he would like further information on a point raised by Mr. Steadman with regard to the risk of the dental ligament owing to the forceps having to be placed high up on the tooth. He took it that Mr. Bocquet Bull did not place the forceps any higher than on the neck of the tooth, which was enamel; and therefore he did not quite see where the dental ligament came in, which was surely connected with the root of the periodontal membrane.

Mr. E. B. Dowsett said that the President had rather cut the ground from under his feet, because he had brought with him a rather ancient book, from which he wished to read a short extract. The extract was as follows:

"Some dentists have recommended in cases of this sort when the space between the adjoining central and lateral incisor is equal to the width of the deviating tooth, to turn the latter in its socket with a pair of forceps. It is scarcely necessary to say, that if a tooth is turned in its socket the vessels and nerves from which it derives its nourishment and vitality are severed, and though its connection with the alveolus may be partially re-established, it will be liable to act as a morbid irritant."

That was written in 1852 by Mr. C. A. Harris. He believed that that was as true today as in 1852. It was obvious that in cases after the apex was closed the pulps died, and therefore, as Mr. Bocquet Bull had said, such treatment could not be attempted; but even in the earlier cases, where the pulp still remained alive, and where, necessarily, one formed a dilacerated tooth, that portion of the peridontal membrane which was there at the time of the operation must necessarily be degenerated, because its tissues were severed. Therefore one would like to see records of the cases Mr. Bull had dealt with in the last year or so, not in 1921, but in 1941, and then one would perhaps know more how to deal with such cases in one's private practice. He was strongly of Mr. Steadman's opinion, in that he did not propose to adopt the practice amongst his own private clientele, as the risk was undoubtedly far too great, and such risks ought not to be run. He had now reached the stage of being old enough to see cases that he had regulated as long ago as twenty-five years, where pyorrhea had undoubtedly been caused by the regulation performed—and he did not think that he regulated them any more violently than anybody else. He had seen cases in the last few years of grown-up men and women whose teeth he had regulated as children, and they had developed pyorrhea. He had kept observations upon them during the whole period. He would like to hear the views of members of the Society as to whether they had had experience of similar cases, where the patients had grown up. He thought that such treatment as Mr. Bocquet Bull had described, which was very forcible, was of such a nature that it would be very valuable to have cases definitely recorded at periods of five, ten, fifteen, and twenty years hence. At present he was not at all satisfied that one should run the risks involved in the immediate movement of teeth.

Mr. A. T. Pitts remarked that there was one name which Mr. Bocquet Bull might have referred to in his short historical résumé—namely, that of Mr. Hopewell-Smith, who frequently used to move teeth by immediate methods when he (Mr. Pitts) was house-surgeon at the Royal Dental Hospital. In contradistinction to Mr. Dolamore's method, Mr. Hopewell-Smith used to say that he always made a greenstick fracture of the outer alveolar plate. Since he (the speaker) had seen the cases which Mr. Bocquet Bull had shown the Society some time back, he had been stimulated to do a few cases himself, and so far—though, of course, these were early days—the results had been satisfactory. With regard to what had been said about the possibility of injury to the dental ligament, that was a point to which he had always paid special attention and he did not think the forceps could be allowed to go even up to the neck of the tooth. He took an absorbent napkin and padded it between the blades of the forceps, so that the cutting edge of the tooth really rested on that pad, and the blade could not extend more than three-quarters of the way up the crown of the tooth. Although that necessitated a little more force on the tooth, it

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could be done, and during the whole of the time the forceps did not actually touch the the gum margin. That certainly eliminated one possibility of infection and injury. Again, the cases he had done had been usually performed under a local anesthetic, although in the cases of very young children probably ethyl chloride would be better.

He had been interested to hear Mr. Bocquet Bull's figures with regard to the age of the children. There was no doubt, of course, that the open apex afforded the better chance, but he wondered whether in doing that, one might not cause a dilacerated condition of the tooth. It might not matter, perhaps, if one did, though if the tooth afterwards required treatment for caries it might provide difficulties for the operator. He had seen a case recently which had been done many years ago, but in that case the pulp had died, and the tooth had discolored very markedly. There was no doubt that in order to arrive at correct conclusions one must, as had been said have a long series of cases recorded over a very considerable period, because if there was any real risk of the pulp dying, or of the tooth remaining permanently loose, it was obvious that the operation was not justifiable; but for himself he was not prepared to take up the trenchantly denunciatory attitude of Mr. Steadman, and he actually proposed to do some more of such cases. One point which was worth laying stress upon was that the splint ought to be very thin, because it needed frequently some adjustment in the mouth, which could be done quite easily with forceps, whereas if the splint was at all thick it became difficult. It was not always possible to alter the position of the tooth on the model and to ensure that the tooth should accurately correspond with the tooth on the model.

Mr. J. H. Badcock said that as Mr. Dowsett had asked for the experience of twenty years, and as it was twenty years since Mr. Sidney Spokes did a considerable series of immediate operations—he could not remember whether they were torsions—it might be that Mr. Sidney Spokes had been able to follow up some of those cases.

Mr. Sidney Spokes said he was rather in a difficulty, because all his work in connection with the immediate movement of teeth was in the advancement of upper incisors over lower incisors, and his experience of torsion was not large enough to be put into the scale at all alongside that of Mr. Bocquet Bull's communication. He felt, however, that he would be inclined to fight shy of torsion. He was not at all satisfied with the few cases he had done. Unfortunately he had not a record of them, but, speaking of the past, the impression left on his mind was that immediate torsion was not a thing to be indulged in—and with regard to the future he had not much interest, except as to what other people did. His few cases of torsion were done in teeth which were older than those described by Mr. Bocquet Bull—in other words, there was an apex already formed. When one twisted round a tooth with a completed apex one really must expect to get trouble at the end of that apex; but with regard to the ordinary advancement of an ingrowing incisor over a lower incisor, he considered that that was one of the safest and simplest and most ordinary operations that one could undertake. As far as he could remember now, without having kept records of all of them, he did about a hundred of them—mostly in a large institution where he could get plenty of material; and in those hundred cases he did not think that any tooth died after the operation. He had been able to see a great many of those children two or three or sometimes four years afterwards, and to note the condition; and his strong impression was that after that interval no single tooth had succumbed. The teeth were all in very good condition, and the only trouble he had had on one occasion was a very slight chipping of the cutting edge of the tooth. That, he considered, was a perfectly justifiable operation; they were good, well-trained children leading a very healthy life. He had never regretted any of those cases, but with regard to torsion, if he were still in practice he would not do it. The results brought before the Society were valuable; but still, if he were in practice he would not treat a misplaced twisted tooth by that operation of torsion. He would not hesitate for a moment to advance a permanent tooth with Grever's forceps, and he had sometimes done both the central incisors at the same sitting—had advanced both of them side by side over the lower incisors, and he had a certain number of models which he would like to present to the Curator of the Society's Museum if he thought they were valuable enough to go on record. He did not

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think it was reasonable to put those two operations side by side except for the purposes of comparison. The one was a very simple one, and the other was at least a doubtful one, and therefore they should not be put in the same category; they ought to be considered as quite separate and distinct from each other. One was the simplest dental operation anybody could be called upon to do, and the treatment results were very favorable; but the other, to which more immediate consideration had been given at that meeting, was regarded by him in the same way as his friend Mr. Steadman regarded it as far as the risks were concerned. He had never had any trouble about forcing the forceps underneath the gums in order to remove the tooth. In the immediate advancement operation there was no access to the external atmosphere whatever; one really got what was called a "green-stick" fracture; one felt the external plate give as the tooth inclined forwards. The gum had never been injured in any way and everything had settled down comfortably afterwards; and there was no reason why one should get any sepsis at all.

Mr. C. H. Housden asked Mr. Bocquet Bull a question with regard to the first case shown on the screen, as to what anchorage he had got. There did not seem to be very many teeth to anchor on with his splint, and he was not quite sure where he would put his anchorage in the models shown. He also wished to ask Mr. Bocquet Bull what he considered to be the best age at which to perform the operation, and also up to what age he considered it was a safe operation. He had had a case of a lady a few weeks previously in his own private practice who had two very discolored central incisors, and he had immediately asked her what had happened to them—had she had any treatment? They were perfectly sound on the crown, and she had had no treatment at all except when she was about eight years old, when she went to a French dental surgeon, and he had said they must be twisted. He twisted them, and he twisted one so much that it dropped on to the floor, and he put it back again. The left incisor was not so bad, and he twisted that and it remained in and did not come out. The upper right incisor was the one he started on first, and he was probably better at it when he tackled the second one! However, he (the speaker) had x-rayed the two central incisors after having opened up through both the crowns. The right central incisor had a very large canal, and the x-ray photograph showed the apex was not closed. On opening it up there was a tremendous amount of discharge, because the tooth was septic. The lady was about thirty-six years old. The tooth discharged very freely, and there was a sinus on to the gum margin. He opened up the upper left one, and found difficulty in getting to the pulp chamber. He drilled into the tooth until the patient felt it, and apparently that one had still a live pulp in it of very small calibre. He was not going to drill any further into the canal, because he was quite certain it was alive. That was the tooth which did not come out. The tooth which had dropped on to the floor was the one which became septic.

Mr. J. H. Badcock, in thanking Mr. Bull for his paper, pointed out that although the operation described had received a good deal of condemnation at that meeting, yet under a certain age Mr. Bull had had 100 per cent success. Above that age he had had 100 per cent failure, according to his figures.

Mr. Harold Chapman said he had understood Mr. Bocquet Bull to say that the splint should not go up in between the teeth at all. It struck him that it might be simpler—and Mr. Pitts also had hinted at it—that if, instead of the cap splint, bands were made to go round the teeth, and then the bands soldered together in the relationship that the teeth are to ultimately occupy, such a splint would take up very little room and not interfere with the bite, and also be more readily capable of adjustment than a cast splint might be. He thought Mr. Bocquet Bull had brought forward a phase of the subject which many members had never practised, and which they might now be encouraged to take up.

Mr. Bocquet Bull (in reply) first dealt with the President's point as to how the extrusion of the tooth by the forceps was avoided in most of the cases described. In one case he had mentioned that the tooth became quite loose in its socket, but he thought that was due to the fact that he had pulled it down rather much to attain its new position.

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There was one other case where the tooth was very loose indeed; that also was the result of the same action. With regard to Mr. Steadman's and also Mr. Dowsett's remarks, Mr. Badcock had answered them for him. He had taken particular care to point out in his conclusions (1) "that an incisor tooth with a well-open apex may safely be rotated by the immediate method"—a conclusion which he had arrived at from the fact that those cases which had well-open apices were at present in quite a satisfactory condition, and (2) those that had more or less closed apices, and also (which corresponded with their age) had died. That was the very thing he wished to point out, and which he had stated later on: "A tooth the root of which is fully or nearly fully developed should be rotated by the slow method."

Mr. Steadman had referred to a tooth which was slightly painful, and which in his experience he believed would remain painful. In the particular case the pain did not persist, because a little while afterwards, after treatment with a counterirritant, it was perfectly comfortable, and had remained so for the following three months up-to-date.

In reply to Mr. Dowsett, he had already explained the difficulties of keeping records at a hospital; but, if he were alive in 1941, and the records were still accessible, he would bring them along.

In answer to Mr. Housden as to the retention for the first case, the case referred to was the rotation of an upper left central tooth. The anchorage was on the upper right central and lateral, and was shown on one of the models.

With regard to the question as to the best age at which to rotate the teeth, and beyond what age one should not go, he thought that so far as age referred to the closing of the apical foramen, it did not enter into the problem at all. It was a question of whether the root of the tooth was developed or not, and knowledge as to that could be quite well obtained by having x-ray photographs taken beforehand.

Mr. Chapman has mentioned the making of bands and their use as splints. He thought that was a very good suggestion, but the reason the splints were made in the manner shown was that one wanted the splint ready beforehand. He then asked Mr. Chapman whether he would go as far as to remove the tooth from the model and fix it in the desired position, and then make the bands to that model.

Mr. Chapman: No; make the bands in the mouth in the ordinary way, and then take an impression, and then treat the model exactly as you did to solder it together.

Mr. Bocquet Bull replied that there was not the slightest reason why that should not be done.

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THE PLACE OF ORTHODONTIA IN SCHOOL DENTISTRY*

By R. Weaver, M.B., B.Ch., M.R.C.S., L.R.C.P., L.D.S.

IN READING the reports of the work of school dentists, one cannot help being impressed by the fact that the policies pursued at different school clinics, working under very similar conditions, vary widely. In view of the fact that dentistry, like the other branches of the healing art, is not a pure science, these differences are inevitable, and it would be a mistake to lay down any hard and fast rules as to what policy should be pursued. At the same time, there ought to be fairly general agreement on principles, and the differences should be confined to matters of detail and the methods of treatment. It is evident that, in the case of orthodontia, there is no agreement on general principles.

Contrast, for example, the two statements which follow. Mr. C. E. Wallis in his book on Dental Clinics, says, "No regulation work involving the use of apparatus should be carried out except such as can be performed by judicious extraction or the use of immediate regulation forceps." The report published in a recent number of the Journal states that, at the Northampton School Clinic, "there were thirty-seven regulation cases, not merely extractions to remedy overcrowding, but cases which took from one to six months to bring the teeth into alignment."

At first sight it would seem impossible to justify both these statements which apparently contradict one another. But it will, I think, be agreed that the authors were both animated by the same principle, namely, to secure "the greatest good of the greatest number," and equally agreed that it is for the individual dentist to decide whether extraction or mechanical treatment is likely to produce better result. The fundamental disagreement is as to whether these cases should be undertaken at all, and there are several factors which have a bearing on the question.

It is probable that the varying policies depend in many cases on the attitude of the dentist towards this kind of work. Orthodontia is a subject which seems to inspire either enthusiasm or positive dislike; there are very few who are quite neutral towards it. Nothing of much value would be gained by expecting those who dislike it to undertake the work on anything but the most modest scale; their successes would be negligible. On the other hand, many men welcome a certain amount of it as a relief from the rather monotonous routine of the ordinary clinic work. In so far as it tends to raise efficiency by adding variety and interest to the work, and thereby possibly leading to less frequent changes in the staff, this aspect should not be entirely ignored. It must be confessed, however, that this consideration is not, generally speaking, a very potent one.

*Republished from The British Dental Journal, April, 1922.

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Another factor is the value of orthodontia from the standpoint of propaganda. Every school dentist is frequently consulted by parents about the correction of irregularities. If he can do anything which will raise him in their estimation and succeed in dispelling the too prevalent idea that he is a mere extractor of temporary teeth, he is doing something of great value, quite apart from the intrinsic value of the work itself. The parents may or may not believe in the results of oral sepsis, but they do believe the evidence of their own eyes, and a successful orthodontic result will in every case convince them that the dentist knows what he is talking about. Until parents clamor eagerly for the treatment of their children's teeth, we can scarcely afford to ignore this form of propaganda, but it must be kept within reasonable limits.

Every school dentist knows that he must limit this work rather stringently. For each parent who consults him about a child's health, there are probably several asking for advice about the treatment of an irregularity which may be mainly an esthetic defect. In many cases, he will not feel justified in spending the necessary time on the treatment, but it is not a very satisfactory way out of the difficulty to tell the parents that the health of another child is more important than the appearance of their own. Outwardly, for politeness' sake they may acquiesce, but in their hearts they do not believe it. Generalized statements are safer, so one lays it down as a dogma that a child's appearance is not a matter of Public Health, and that the community cannot be responsible for a matter of personal appearance.

Nevertheless, when making such a statement, I feel that at some time it may be challenged. The parents may never (dare I say it?) have heard of George Bernard Shaw, but they may be imbued with the spirit of the teaching laid down in his preface to "The Doctor's Dilemma." There these words appear, "Be careful to go to a school where there is what they call a school clinic, where your nutrition and teeth and eyesight and other matters of importance to you will be attended to. Be particularly careful to have this done at the expense of the nation, as otherwise it will not be done at all, the chances being about forty to one against your being able to pay for it yourself, even if you know how to set about it."

We have travelled a long way from the time when Malthus laid it down that no man has any claim on society for even subsistence if his labor will not produce it, and it is now the fashion to demand at the expense of the community anything for which one cannot pay directly.

As a matter of fact, the parents could make out quite a good case on two grounds. In the first place, the child's appearance is not a matter of indifference. Any school dentist would be right indignant if the local authority asked him, on the grounds of economy, to put a copper amalgam filling in an anterior tooth, even although the original cavity were equally black. In the second place, our work is not, strictly speaking, Public Health work, and it will be necessary to examine wherein lies the difference.

The Medical Officer of Health is usually, but not necessarily, School Medical Officer, and at the present the medical service is not under the Ministry

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of Health but under the Board of Education. Public Health authorities are not expected to devote themselves, to any great extent, to the treatment of disease, and where they have done so, as for example at Bradford by establishing a municipal hospital they have aroused a storm of protest. On the other hand, school medical authorities undertake the treatment of numerous cases of noninfectious disease, including such matters of personal appearance as nevi. Their powers are very wide and at present there is a dispute at Willesden as to the scope of the school medical treatment, the local doctors protesting that it is too wide.

If we are to decide what is to be done about orthodontia, the real question is not what individual parents would like, or what the dentist would like, but what his employers, in other words, the community as a whole, would like. He is paid to advise the representatives of the community and to carry out their wishes, and, provided these representatives take an enlightened view of things, their wishes must decide the matter.

The cases of irregularity which one sees may be roughly divided into three groups.

1. Those where the irregularity can be easily corrected by trivial operation such as the extraction of one tooth. There will, I think, be general agreement that these cases should always be treated.

2. Those where the irregularity is so marked as to seriously reduce and endanger the efficiency of the masticating apparatus. Most of us would probably agree that every effort should be made to improve these cases.

3. A large intermediate group. This includes those cases where the defect is much more serious from the point of view of appearance than of efficiency. As an example, I may mention the fairly frequent cases of rather prominent canines, where it might require "one to six months to bring the teeth into alignment." Is the dentist to advise that this group should be treated or not?

I am not unmindful of the fact that the orthodontist will probably assure us that every case of irregularity is a source of danger to the whole denture, and that by treating these cases we may help to prevent trouble later on. The ordinary dentist, feeling that in a considerable number of these cases the danger is almost negligible, will probably say that in the time at his disposal it is better to treat (say) ten cases of established caries rather than one case of hypothetical caries. As a matter of fact, the local authority, wishing to see an imposing array of figures in return for its money, would in most cases agree.

On the other hand, some one might say that surely prevention is better than cure. This is true, but the terms prevention and cure are only relative. The treatment of caries is not an end in itself; it is only a means to an end. In other words, it is the prevention of more serious disease.

Under present conditions, therefore, the cases in Group 3 should be let alone. If the staffs of the clinics were adequate, what then? It becomes a question of politics rather than of dentistry, and will be decided by the view which the local authority takes of its duties towards those whom it represents.

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REPORT OF CASES*

By Dr. Harry E. Kelsey, Baltimore, Md.

I HAVE to make an apology in the beginning for a misunderstanding with regard to the cases I am to show. I promised Dr. White I would show two or three cases. He put me down for three, and two of them are Class II. I did not understand these were to be selected. Dr. White asked me to show cases of which I have casts taken several years after treatment. I will show you one Class III case of which the last casts were made after a lapse of five or six years since the treatment was finished.

The case I am to show was one of the most exaggerated Class III cases I have ever attempted to treat, especially in view of the fact that the patient was about twenty years of age.

Fig. 1 shows the original casts and those taken a few months after the treatment was completed. The appearance of the original casts indicates clearly that they were made before I had learned the value and satisfaction of properly trimmed models.

Fig. 2. This is simply a copy made from my original casts properly articulated and trimmed, giving in addition an occlusal view. Looking at the slide you will see a premolar and first molar were lost on the left side, and a first molar on the right side. These teeth were extracted to correct this malocclusion. I suppose, when the patient consulted a dentist for treatment the dentist immediately said to himself, "What teeth shall I extract?" He doubtless thought he had to extract some of them, there being at that time overlapping and crowding of the anterior teeth. The result was possibly a little better alignment of the anterior teeth, but the spaces were closed up and the arch diminished in size.

Fig. 3. The plan of treatment I adopted in this case was to restore as much of the space as I could at the same time correcting the mal-relation of the arches. This was a good many years ago and to some extent was experimental. I put on the usual intermaxillary elastics with the old E arches and used ligatures. It was before the day of the pin and tube appliance, and I did it with such appliances as we had at that time. After about a year or more I had succeeded in bringing about this result.

You will see there has been some space secured on the left side, and a little retaining appliance was put there with a spur to hold it, and later the same thing was done on the right side. The relation of the arches, I think you will agree with me, has been corrected pretty well, considering the patient's age and the loss of tooth structure in the maxillary arch. At this time I felt very much encouraged. Two of the anterior teeth were devitalized before he came to me; there was caries and considerable destruction of tooth tissue, and at an early age he must have worn his front teeth before there was protrusion of the mandibular arch.

*Presented before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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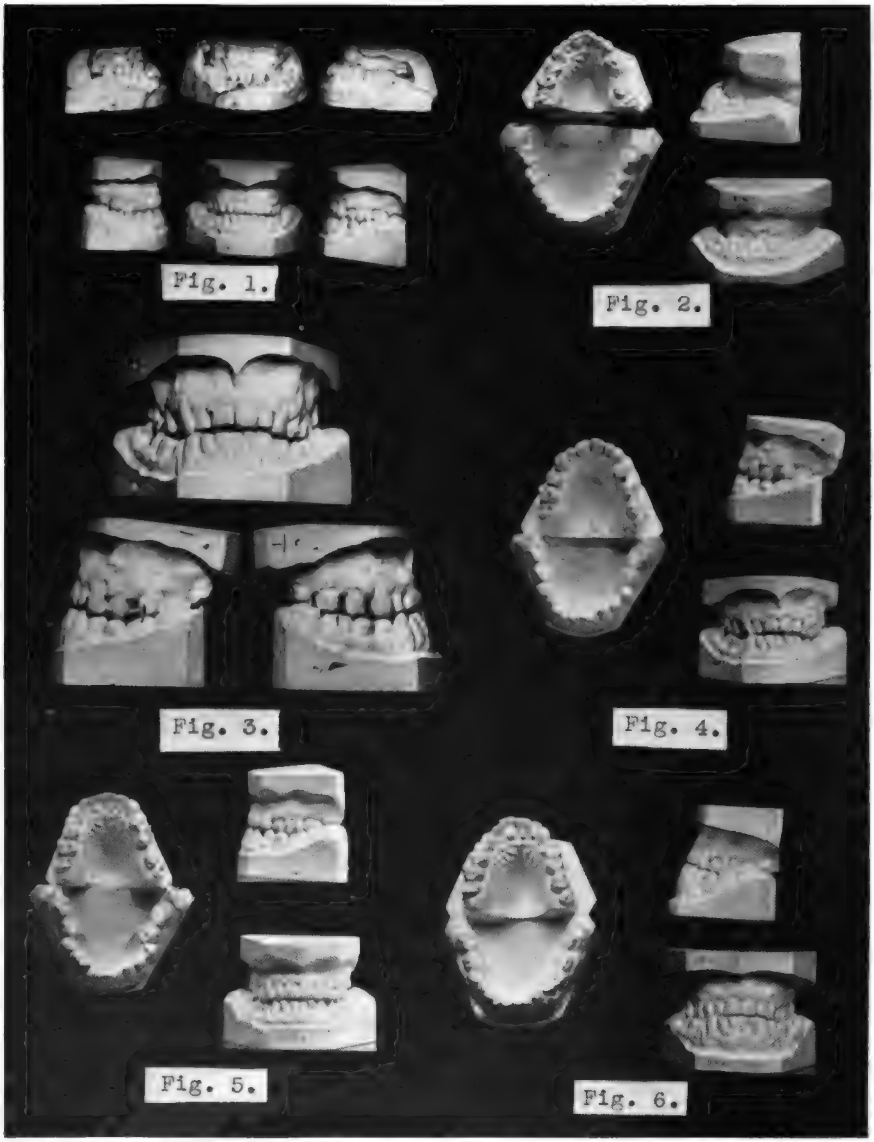
Fig. 4 represents the case a little farther along, and shows that the alignment of the mandibular teeth is not exactly what it should be, yet it was progressing, and there has been quite a little more space secured between the maxillary premolars and molars.

Fig. 4 represents the case at the same time as the other slide, but shows



the occlusal view. You will see the spaces gained on both sides where teeth had been lost. The object was to protrude the anterior teeth with the molars and intermaxillary elastics as anchorage, thus enlarging the arch and carrying it forward at the same time.

Fig. 5 represents the case at a later stage when I had succeeded in getting as much space where teeth were lost as seemed practicable. I had as good alignment as seemed possible and had secured fairly good mesio-

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distal relation of the teeth, but owing to the enormous width of the mandible I did not succeed in getting the maxillary teeth into a perfectly normal bucco-lingual relation and the position of the mandibular teeth in relation to the maxillary teeth was not exactly what one would desire. At the same time, he was leaving the vicinity of Baltimore and I had to bring it to a conclusion, as his business and other matters prevented him from giving more time to it. I sent him to an excellent dentist and he put in two restorations, one between the premolar of the right side and one between the canine and second premolar on the left. He also cut off four anterior teeth, two of which were devitalized at the time, and put crowns on them. This gave the man a very good looking set of teeth and very greatly improved his appearance. At the time he came to me his speech was very indistinct owing to the great projection of the mandible and the tipping of the maxillary anterior teeth into the cavity which the tongue ordinarily occupies, so that one could not readily understand him. It was not easy for me to carry on a conversation with him. By the time the teeth were in this position he spoke as distinctly as the average person.

Fig. 6 represents the same case a little over five years after the one you saw last. That was taken a few months after the dentist had made the restoration, and this about five years later. Careful examination shows there is a slight narrowing of the maxillary arch, but the mesio-distal relations have not changed which in conjunction with the fact that the patient is now a successful business man and is thought to have a good looking mouth and set of teeth may make such an exaggerated case worth showing in connection with the subject of permanent results.

LOCKING DEVICE FOR LINGUAL ARCH*

By Horace L. Howe, D.M.D., Boston, Mass.
Instructor in Orthodontia, Harvard University Dental Department

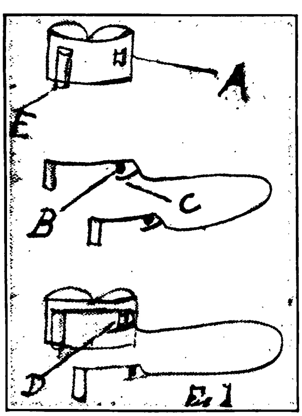

Fig. 1.

A LOCKING device which the writer has found quite strong without some of the disadvantages of the earlier types, is shown in Fig 1.

A short piece of half-round tubing is shown at *A* which is grooved upon its upper and lower surface. *B* is a post (which need not be of accurate fit of *A*). This post engages in the tube *A*. (This aforesaid post I have added since the meeting at Atlantic City.)

C is an 18-karat gold wire of 19-gauge which securely locks the arch when pushed under the grooved tube as shown at *D*. With this lock the tube *E* may be longer because it has no wire below that would injure the gum tissue.

Also the lock is nearer the front of the arch which gives greater stability.

*Clinic given before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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CASE REPORT*

By Allan Holman Suggett, San Francisco, California

THIS case shows appliances for moving impacted canines. The base wire is adjusted lingually of the impacted canines and may be straightened out to follow them as they are moved by the springs attached to the base wire.

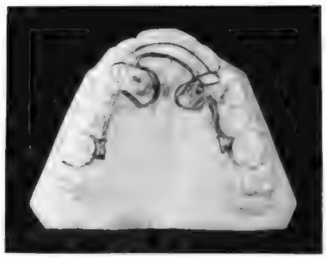

Fig. 1.

REPORT OF CLASS II CASE EIGHTEEN YEARS AFTER TREATMENT†

By Horace L. Howe, D.M.D., Boston, Mass.
Instructor in Orthodontia, Harvard University Dental Department

THE models illustrated in Figs. 1 and 2 are of a typical case of Class II before treatment. The models were made in October, 1903.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.
†Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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Photographs taken at that time are shown at Fig. 3 and 4.

The case was treated with intermaxillary elastics in the usual manner and the models shown in Figs. 5 and 6 were made in 1904. Photographs taken at the same time are shown at Fig. 7 and 8.

The models shown in Figs. 9 and 10 were made in 1920. The occlusion has remained in its corrected position. The improvement in the facial lines may be seen in comparing photographs 11 and 12 with Figs. 3 and 4.

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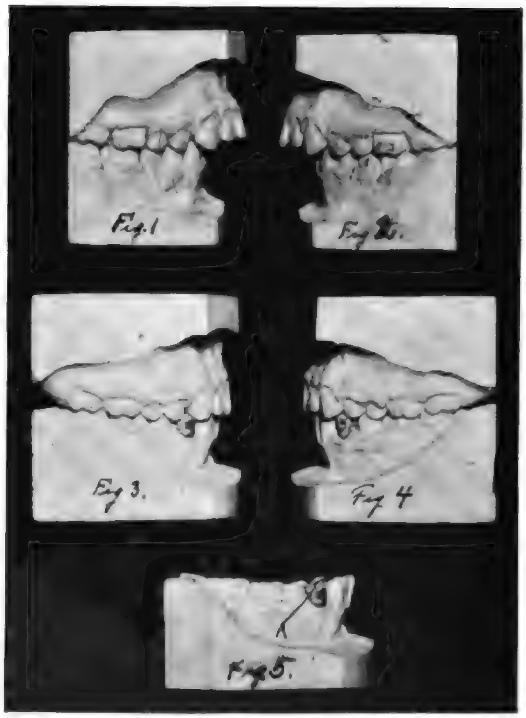
INCLINED PLANES FOR RETENTION IN CLASS II CASES*

By Horace L. Howe, D.M.D., Boston, Mass.
Instructor in Orthodontia, Harvard University Dental Department

THE case illustrated in Figs. 1 and 2 is a typical case of bilateral distal occlusion before treatment.

Figs. 3 and 4 show models of same case after treatment.

As an aid to maintain these cases in normal occlusion the writer has found an inclined plane as illustrated in Fig. 5 at *A* most helpful.



This inclined plane is built on a band adjusted to the first mandibular premolar made to occlude in front of the palatal cusp of the first maxillary premolar above.

Those who have treated Class II cases know how often the occlusion is inclined to slip back to its distal condition.

These inclined planes as well as inclined planes upon the maxillary molars, I have used for eighteen years with much satisfaction.

*Clinic given before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of
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SOME POINTS OF TECHNIC IN CLEFT PALATE SURGERY

By Joseph A. Pettit, M.D., F.A.C.S., Portland, Oregon
Professor Clinical Surgery, North Pacific College

It is assumed, and possibly not incorrectly, that the unusual degree of vascularity of the tissues of the oral region spells a greater degree of resistance to infection, and at the same time greater proclivity for prompt and primary union of surgical wounds. The conclusion is logical: that the degree of resistance to infection is in direct ratio to the degree of vascularity of a part. It is a pathological entity that vascularity favors the production of healing by scar tissue.

In the oral cavity, there seems to be a greater degree of immunity to the ordinary low-grade microorganism. It is assumed this is due to the establishment of a local immunity by reason of the continued presence of this type of low-grade microorganism in the oral cavity, as well as to the natural resistance derived from the vascularity of the parts.

In view of the foregoing successful union occurs early, if it is going to be a successful union. It is usually possible to remove the coaptation sutures in six to seven days. The retention or supporting silver wire sutures are usually best left in a few days longer, in order that they may continue to exert their restraining influence over the muscle pull.

Within the province of this paper, it is not intended to take up any consideration of the mooted etiologic factors concerned in the cause of cleft palate. In this connection it is only desired to draw attention to, as well as emphasize the fact, that in most cleft palates the deformity does not represent so much the lack of soft tissues and bone structure, as a displacement of soft tissues and bone structures. Whether this displacement is a result of the failure of the embryonic processes to unite, or whether a primary displacement prevents the proper union, matters not. The average defective palate presents the analogy, wherein a sufficient amount of tissues for a flat roof

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having been produced by nature, by some process the direction is changed so as to assume the form of a gable roof. By reason of the direction being changed to an upward obliquity, there is left at the top a gap, the width of which is in direct ratio to the degree of obliquity. In some instances there apparently exists a certain deficiency of tissues, especially in very young babies, which deficiency, as a general rule, will lessen as the child reaches the age of two years or more. With this fact in mind, proper reconstruction endeavors to transfer sufficient tissue from the gables in order to construct a so-called "flat-roof" for the oval cavity. The early operative procedures in this region were not carried out on this basic principle, and therefore the early successes were meagre compared with the results of present day palatal surgery.

A study of the ordinary cleft palate will disclose the fact that on either side, the palate processes of the superior maxillary bones and the horizontal plates of the palate bones are situated in a semivertical position instead of the normal horizontal position. Measurement of the width of each ledge will usually disclose the fact that the combined measurement is adequate, or nearly so, to bridge the roof of the mouth in a horizontal direction. This measurement at

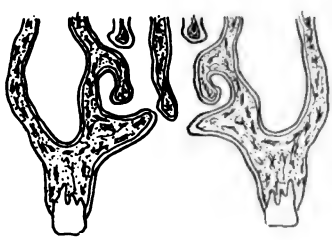

Fig. 1.

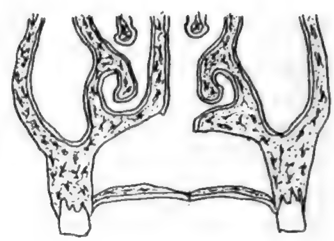

Fig. 2.

Fig. 1.—Mucoperiosteal flaps in the horizontal position to span the gap.
Fig. 2.—Obliquity of cleft gives adequate flap.

once discloses the degree of facility or difficulty to be encountered in an attempted repair.

In making preparations to construct the new horizontal roof of the oral cavity, it is necessary to give consideration to two rather important features. First, the tissue flaps transferred must have adequate nutrition to maintain their integrity; second, the tissue flaps must be of adequate substance to form a roof equal to the stress and strain required for this important boundary of the oral cavity.

It has been proved that if the tissue flaps to be dropped down are composed of the mucosa, the submucosa and the periosteum of the undersurface of the palate processes, undisturbed in their relationship to each other, a new structure is formed thereby of a thickness and strength adequate for all the requirements of nature. Undoubtedly the transferred periosteum reproduces enough osseous tissue to give perfect firmness and strength. The circulation of the palate, upon which we must depend for its integrity, comes from two sources: namely, the posterior palatine arteries emerging from the posterior palatine foramina, in the suture line between the horizontal plate of the palate

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bone and the posterior border of the palate process of the superior maxillary; and from the nasopalatine artery emerging from one of the openings in the anterior palatine foramen, situated in the suture line between the palate processes on either side at a point where they join with the alveolar arch. In complete cleft palates this anterior blood supply may be disturbed or absent. Another source of nourishment, not to be depended upon, is from

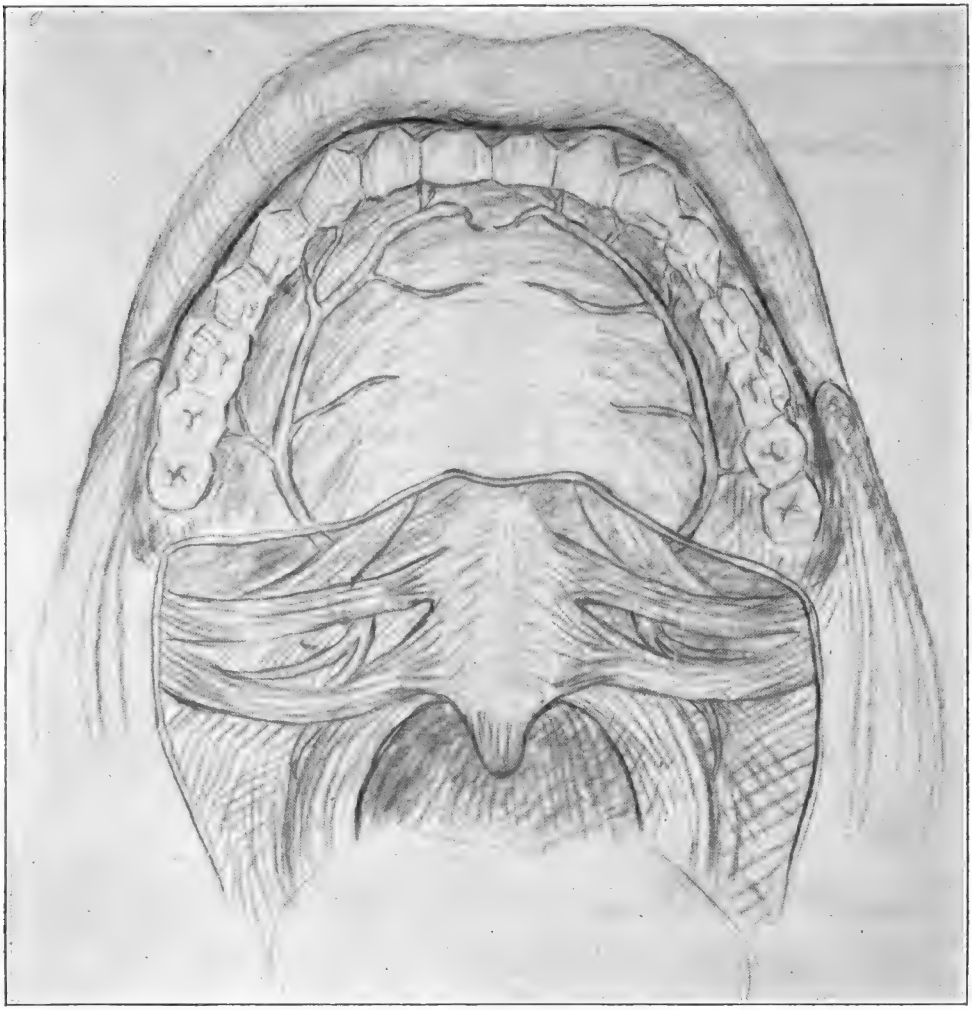

Fig. 3.—Palate vascularity and musculature.

the anastomosis with tiny vessels derived from the continuity of the alveolar soft tissues anteriorly and laterally, and from the pillars of the fauces posteriorly. The posterior palatine artery encircles in a groove the periphery of the hard palate at its junction with the base of the alveolar process. The avoidance of injury to this vessel in elevating the periosteum requires a combination of tactile skill and some good fortune.

Tension of any degree is inimical to the union of a palate suture line.

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This not only applies to the posterior but it also applies to the anterior portion of the sutured cleft palate. If an approximation without tension does not occur, the flaps are dropped down, and elevated laterally, going over the alveolar process, in order that a free apposition may be secured. If the edges are drawn together by tension sutures, these sutures will not hold an

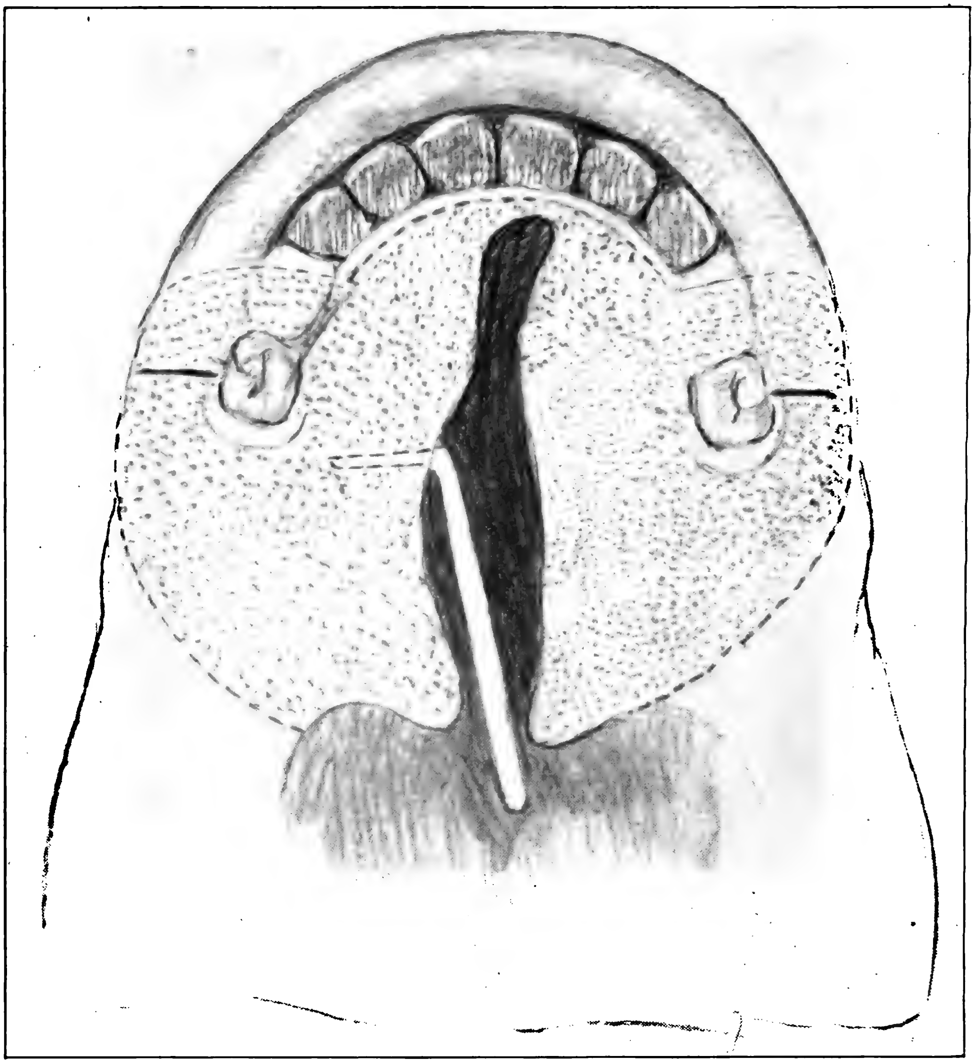

Fig. 4.—Elevation of lateral tissues to gain free apposition of edges.

adequate length of time for union, since they readily cut through the tissues by "pressure necrosis," and failure of union invariably ensues.

In considering the suture of the posterior portion of a palatal cleft, another source of tension requires consideration. This is the contraction pull of the palatoglossus and palatopharyngeus muscles, composing respectively the anterior and posterior pillars of the fauces. Even though the tissues of the soft palate and the posterior extremity of the hard palate lie in perfect

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and easy apposition under anesthesia relaxation, each act of crying or swallowing on the part of the child produces a pull through these muscles upon the line of suture. This constant intermittent traction on the coaptation sutures will inevitably disturb the coaptation of the suture line.

This factor is overcome by placing a device posteriorly which takes up the strain of each muscular contraction and protects the coaptation sutures. Two or three annealed silver wires are passed through the muscular velum some distance from the suture line, fastening them on either side to a prop-

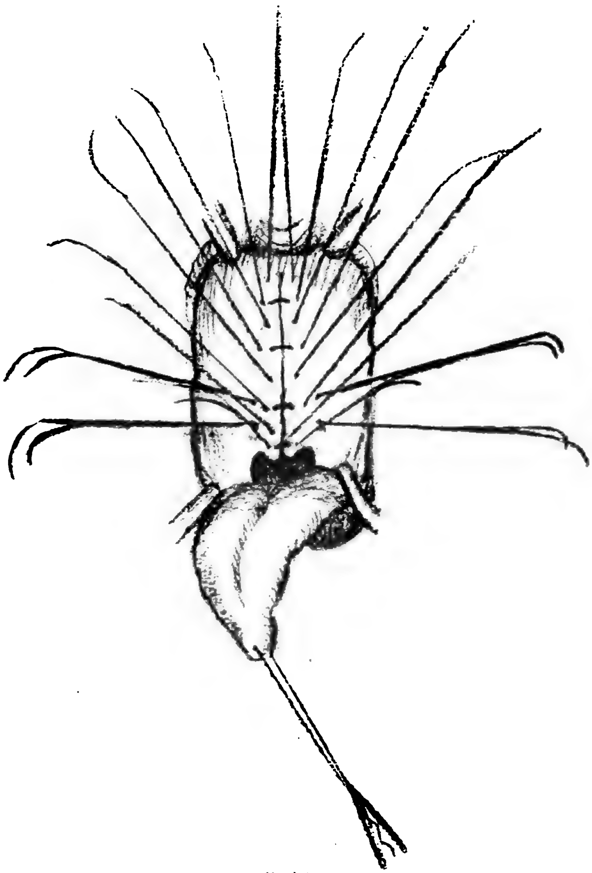

Fig. 5.

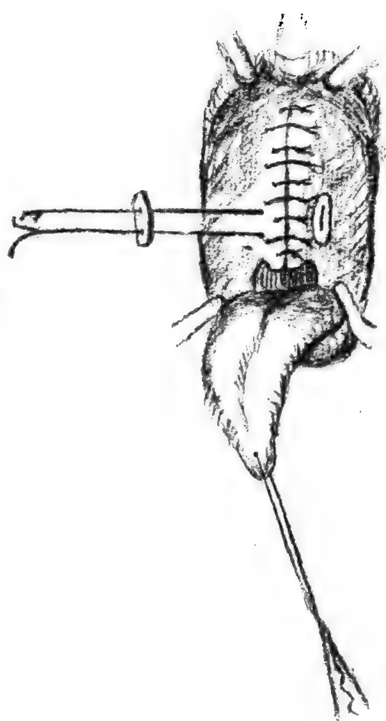

Fig. 6.

Fig. 5.—Silver wires and horse hair sutures (partly Fig. 8) united.
Fig. 6.—Lead plate splints being placed on palatal muscles.

erly constructed lead plate through perforations therein. This can better be described by the illustrations accompanying this article than by pen description. The silver wire sutures are drawn up to a point of tension, whereby a slight bulging of the suture line is produced. The lead plates serve a double purpose. First, they act as a splint on the muscles; and, second, they prevent the wire sutures from cutting through the soft tissues during tension of muscular contraction, by reason of the broad surface presented to the soft tissues.

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It is only intended in this paper to take up certain of the details of cleft palate surgery, and not to go minutely into the entire procedure. The operation requires instruments of a type suitable for the tissues to be handled and the cavity in which the operation is performed. A facile elevation of the mucoperiosteal flap is only accomplished with elevators of special shape. The so-called fishhook needles permit the return stitch to be made with greater ease and more accuracy than the ordinary curved needle. The horsehair used must be of the best quality and strength and should be securely tied, but without too great a degree of tension. The lead plates are made of a size and shape to fit the individual case, and long enough to "splint"

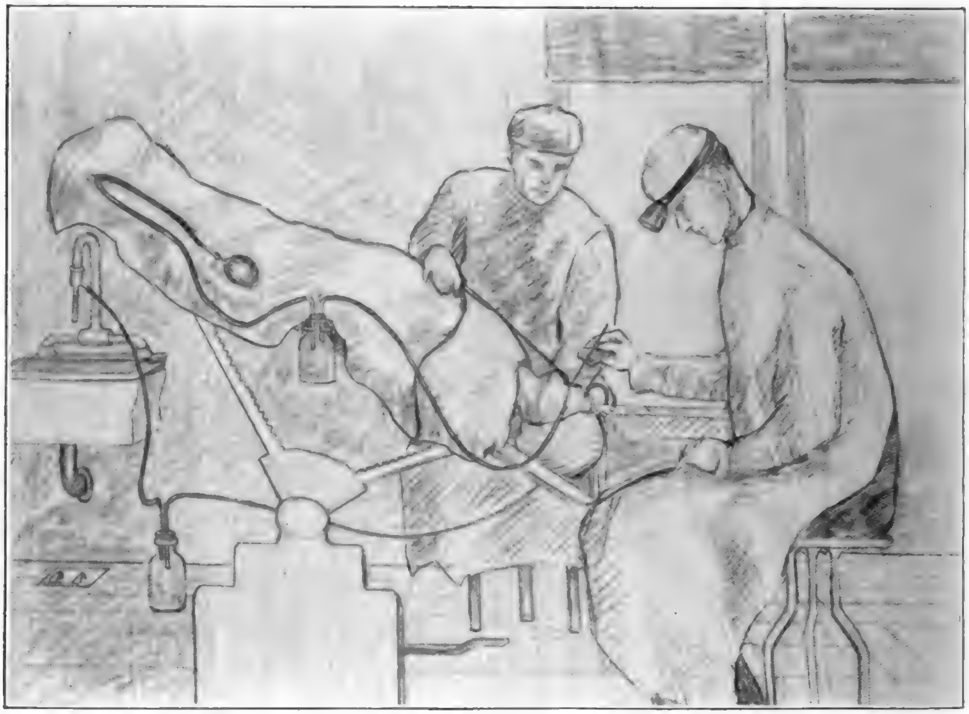

Fig. 7.—Advantageous setting afforded by Trendelenburg position.

the palatal muscles. The annealed silver wire is best used double and not of too large a gauge.

We have always felt, with many others, that ether is the safer as well as the more logical anesthetic for this type of operation, even in the very young. A deep narcosis is usually unnecessary, as the child can be kept under lightly most of the time. The nicety of chloroform anesthetic cannot be denied. In the hands of an experienced anesthetist it may be safe.

It is desired to emphasize at this time the "stage setting" for this procedure as well as for other surgical procedures in and about the oral cavity. Certain details have been carried out by us for many years in our clinic work which have especially facilitated the procedure of this type of surgery, as well as the safety of the patient. Fig. 7 is possibly more descriptive than words.

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First.—With the child placed in the extreme Trendelenburg position, the advantages of this position are obvious. All of the blood gravitates into the nasal cavity and none goes into the pharynx; therefore, the child will neither swallow nor aspirate blood into the larynx. No vomiting of blood occurs following operations performed in this position, and the danger of aspiration pneumonia is eliminated. The blood can then be readily sponged

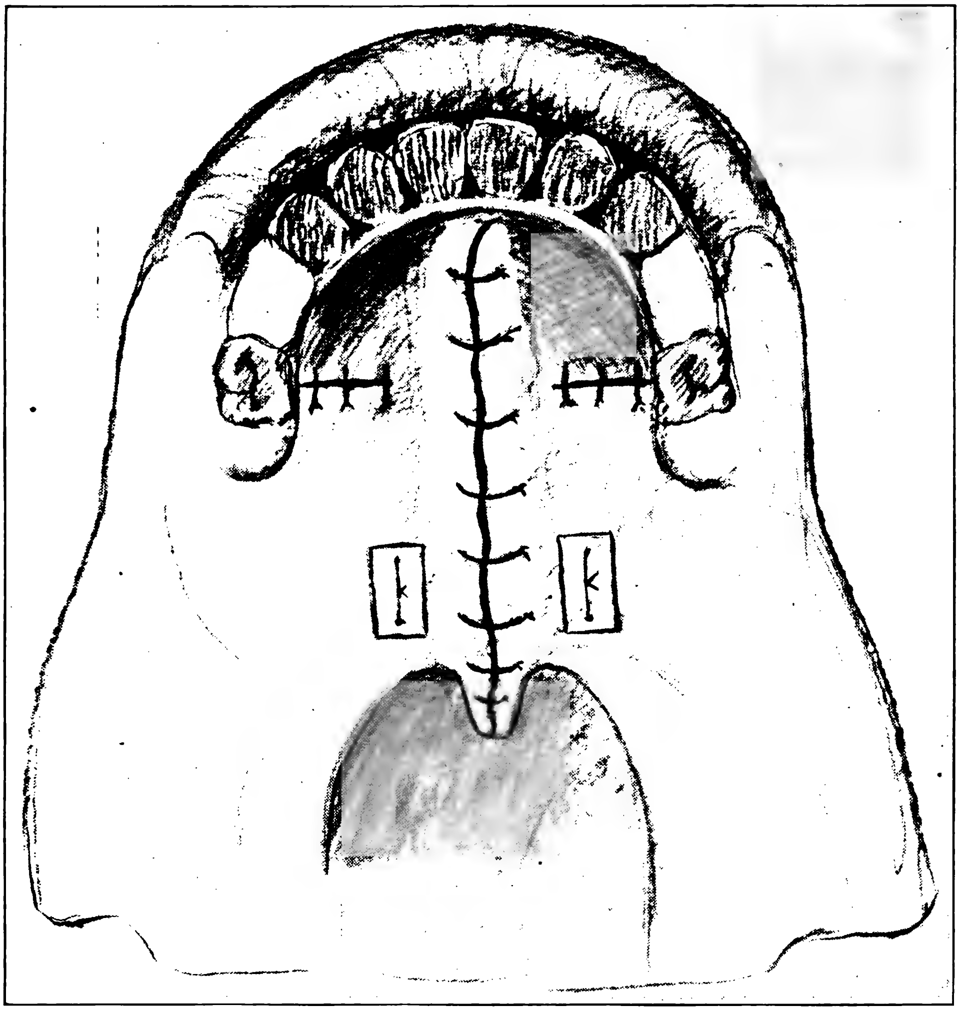

Fig. 8.—Obtaining additional tissue by going beyond the alveolar process.

away, or constantly removed without the bother or time loss of sponging by the "sucker" appliance as described below.

Second.—The operator sits upon a stool and looks directly down upon his field of operation. This position gives the operator a comfortable position to occupy during this tedious procedure, and at the same time to some degree at least puts his operative field before him on a "flat" surface. With his headlight the field of operation is always provided with ample illumination.

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This illumination is constant and free from any disquieting shadows. The operator and headlight occupy a minimum amount of space, thereby enabling him to make available a greater amount of assistance by others.

Third.—A rubber catheter which is passed into one nostril and attached to a "sucker" removes the blood from the nasal cavity as rapidly as it is spilled, thereby keeping the operative field clear from this impediment to rapid work, and reducing the necessity of sponging to a minimum. Some

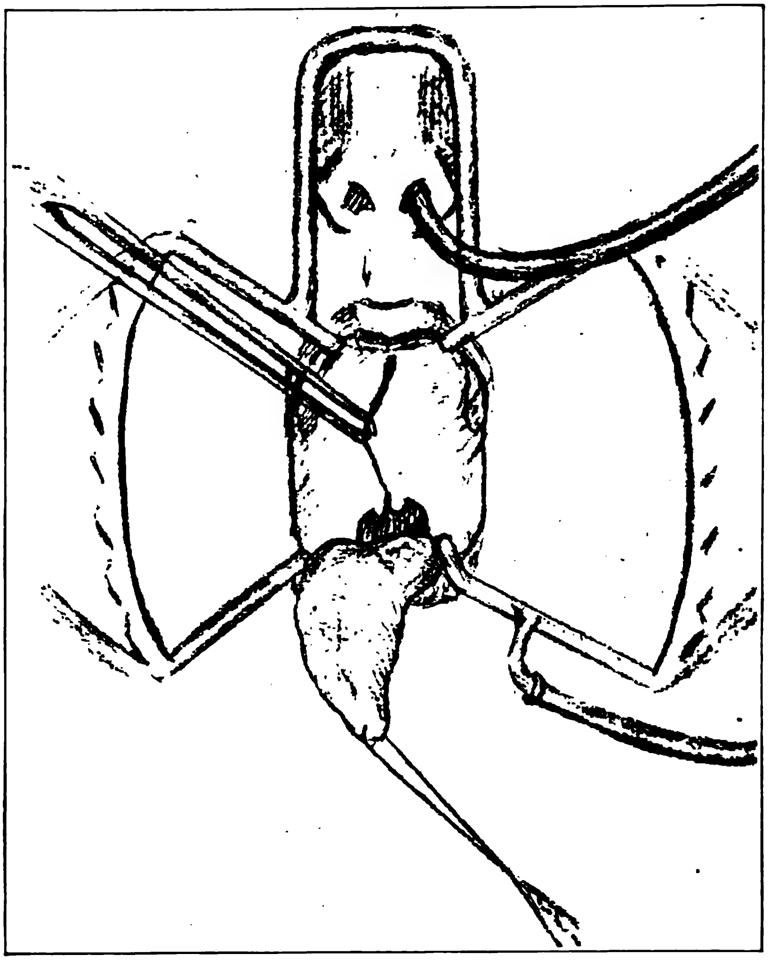

Fig. 9.—Adequate tissue: the results of extensive undermining.

of these operations have been performed from beginning to end without the use of more than half a dozen small sponges.

Fourth.—An assistant with one hand adequately keeps the tongue out of the way by a suture through the tip of the tongue.

Fifth.—The anesthetic is given by means of the conventional blower and the anesthetist is entirely out of the way.

The time for the repair of congenital defects of the oral cavity has been a matter of considerable difference of opinion. As time goes on it is more

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generally conceded that the earlier these procedures are carried out, the better it is for the child.

The hare lip operation should be done very early in infancy for many reasons. First, this facilitates the child's ability to nurse and secure a reasonable amount of nourishment. Second, the reconstruction of the lip with the fibrous bands across the alveolar process is an important factor in narrowing the cleft of the alveolar process directly and of indirectly drawing together the two superior maxillary bones by narrowing the entire length of the cleft part of the cleft hard palate.

The cleft palate operation should without question be performed before the child acquires the habit of imperfect speech. The procedure on a healthy baby produces but little shock and the mortality is extremely low. If the cleft is especially broad, and on this account it is necessary to secure flaps from over the alveolar process and even from the side of the cheek, it is necessary to secure flaps from over the alveolar process and even from the side of the cheek, it is very advantageous from a surgical standpoint to carry out this procedure before the lateral teeth erupt. We have done it after the teeth have erupted and cut new openings in the transposed flaps for certain teeth, with success but not without great difficulty. Accompanying Figs. 8 and 9 illustrate this method of securing additional tissue for the flaps, when they are inadequate in size to bridge over the cleft. The consideration of these principles is not in the province of this paper, and therefore is only briefly mentioned.

The judgment of the surgeon and the attending pediatrist must make the decision of the exact time for operation in individual cases. The wisdom of refraining from operating on a child with malnutrition or poor physical condition is obvious. Each case must be considered individually and weighed on its own merits.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

SOME PROCEDURES FOUND HELPFUL IN MAKING DENTAL RADIOGRAMS*

By J. A. Blue, D.D.S., Birmingham, Ala.

THERE are many things that go into making good readable radiograms—that is, radiograms of the proper density to be of real value in diagnosis—and the intention of this paper is to mention a few methods found to be helpful in obtaining the desired results.

Twenty milliamperes with a three and a half to four inch back up and exposure time of from three to five seconds should give the desired density, the films reaching their full development in five to six minutes.

In some cases a preliminary checking of the full mouth can be made using ten films, showing the maxillary first, second and third molars on the first film, the lateral, canine and both premolars on the second film, the central incisors on the third, and the opposite side on the next two films with the teeth as mentioned for the first and second films. For the mandible, the first, second and third molars are shown on the first film, the canine and both premolars on the second, the four incisors on the third and the opposite side on the other two films. Any further checking to complete the diagnosis may be made as needed, the operator being governed by what is shown in the radiograms mentioned above. Don't understand me to say that a complete diagnosis should be made from ten pictures though this can be done, as far as apical areas are concerned, in some cases where all the teeth are vital or where there are only a few pulpless teeth. I believe there should be no limit to the number of radiograms made in a given case, until the diagnostician is satisfied that all suspicious areas have been checked in a way that nothing more can be shown by the radiogram.

Films can be cut to any desired size and shape by taking the stock films into the darkroom and cutting wrapper and film together and binding the edges with ordinary binding, or passe partout, paper. This can be done rapidly by your assistant and a number of sizes cut at one time and kept for

*Read before the American Society of Dental Radiographers at Los Angeles, Cal., July 19, 1922.

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use. These odd sizes come in handy in many cases, such as pyorrhea cases, in the mandibular canine region, and in the maxillary and mandibular anterior, in V-shaped mouths, and for children. Duplitized films can also be cut in any size desired. The duplitized films being much faster than the regular and

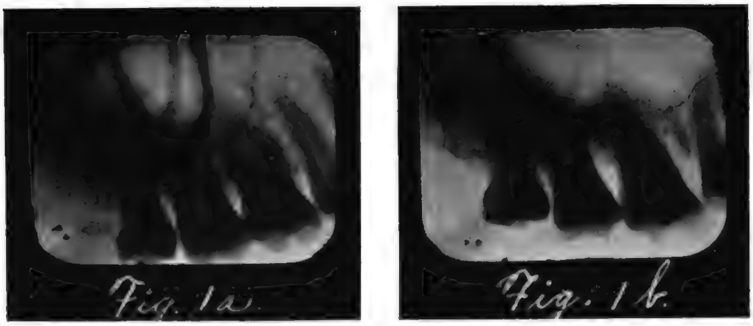

Fig. 1.—*A* and *b* show the malar shadows interfering with a view of the apices of the molars, which could have been avoided by lowering the tube slightly and directing the rays under the malar bone. In this case there is plenty of room on the film to elongate the teeth sufficiently to eliminate the shadows.

Fig. 2.—The film was placed too high in the mouth. The malar shadows are well out of view but the crowns are not perfectly shown, which is essential for the detection of cavities and contact points.
Fig. 3.—The posterior portion of the film should have been placed higher in the mouth.

Figs. 4 and 5.—These were made with flexible films which accounts for the lack of definition along the upper border which is due to excessive bending.

therefore requiring shorter exposures, are very valuable in the so-called bite picture.

Films should be thoroughly fixed and properly washed in order to have them retain their detail. Living in the south, where the temperature of

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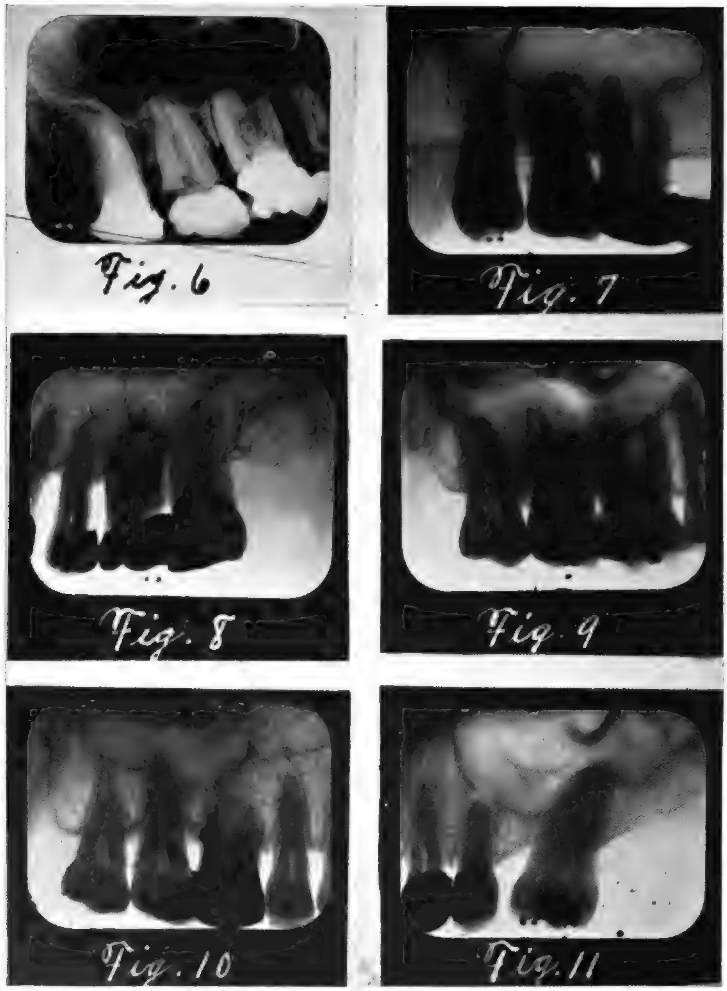
hydrant water is high, I have found it advantageous to have an ordinary water keg in which a copper coil has been placed, with the inlet at the bottom and the outlet on the side. This keg is filled with ice to furnish cold water for the washing bath. A galvanized tank was constructed, size 14 × 10 × 6 inches, and a series of holes cut in one side for the overflow at any given point desired, depending on the number of films to be washed. A galvanized tube was placed in the tank to reach and extend across the bottom,



Figs. 6 to 11 inclusive.—These were exposed while being held rigid with a stiff piece of metal attached to their backs. These are in a position which shows the entire crowns as well as eliminating the malar shadows.

the portion of the tube in the bottom of the tank being perforated with a number of holes which were made with a No. 10 bur. A rubber hose connects the tank tube with the water supply leading from the ice keg. The water is allowed to run slowly through this tank for fifteen minutes, at which time the films are free from hypo. The films are then hung in the breeze of an electric fan and allowed to dry. In ordinary weather they will dry in from ten to

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fifteen minutes. One set of films is mounted on suitable film mounts so they can be studied when the diagnosis is being made and the other set is placed in an envelope, size 3 x 5 being preferred as they are convenient to handle, and filed in a suitable cabinet for future reference.

The problem of angles must be largely worked out by the individual operator as no set rule can be applied to all cases. There must be some variations—angles must be bisected in such a way that the desired results may be obtained. Some time ago I started out to prove that the malar shadows could be consistently thrown high enough not to interfere with the apices of the roots of the maxillary molars and at the same time use a 17-inch target distance. This can be done in at least 90 per cent, and possibly more, of the cases which are presented. The 10 per cent will compose the cases which have very low arches, and freak cases such as a decided buccal presentation of the cusps and cases of irregularity. It has been found that better results can be obtained by bisecting the angles, using the teeth and palate as a guide, rather than taking into account the position of the malar bone. If the malar process is low and the arch very flat it is impossible to throw the malar shadows off the film without producing root shadows which are too much elongated. It then becomes necessary to raise the tube directing the rays downward, thereby obtaining a view of the palatal root and foreshortening the buccal roots.

A good view of the roots and general position of the maxillary third molar when impacted may be obtained by projecting the rays between the zygomatic arch and the temporal fossa. The tube is raised and tilted back and the rays, directed downward and forward in line with the film, pass through the structures mentioned above, and instead of the zygoma being thrown up, its shadow is cast buccal to the first and second molar crowns.

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A QUESTION THAT HAS HITHERTO FLOORED ME

By Howard R. Raper, D.D.S., Indianapolis and Albuquerque

When advocating removal of granulomata as opposed to treating such cases by ionization or cauterization through the canal, it is the common thing for the advocate of the surgery to say: "Show me where, in the whole realm of medicine and surgery, any such treatment is given as that done by dentists through the pulp canal for periapical infection."

Of course the questioner does not expect an answer and I confess the

Fig. 1.—The lung on the reader's right is partially collapsed, or compressed, rather, by the pressure of air injected into the thoracic cavity. (This illustration is reproduced by courtesy of the New York Medical Journal and Dr. L. S. Peters of Albuquerque.)

question has, on occasions past, "settled me." But I have recently found an answer; one with a "kick" in it.

When the next 100-per-cent extractionist asks me that question I shall say, "How about artificial pneumothorax in pulmonary tuberculosis?" And then I shall have to explain what artificial pneumothorax is thus:

We have, let us suppose, a case of pulmonary tuberculosis. One lung is in fair or good condition, the other has a pathologic cavity in it—a pyogenic cavity; a pus cavity if you please. Nature is unable to cope with the situation; the patient is dying. Enter artificial pneumothorax. A small hollow

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needle is forced between the ribs into the thoracic cavity and sterile air is pumped into the thorax. This operation is repeated once or twice a week or as frequently as judged expedient by the operator until the lung is compressed.

Fig. 1 shows partial compression of the lung on the reader's right. Fig. 2 shows practically complete compression of the lung on the reader's right.

And what becomes of the patient? Well, take Fig. 2, the case of a nurse who was treated, recovered, and has been back at work continuously now for four and a half years. Of course all cases are not so successful as that shown in Fig. 2, but then a really remarkable percentage are successful.

Fig. 2.—The lung on the reader's right is almost entirely compressed (save at the apex) over toward the median line. (This illustration is reproduced by courtesy of the New York Medical Journal and Dr. L. S. Peters of Albuquerque.)

I should say also that this patient (Fig. 2) lives in Albuquerque where the dry air (equivalent in therapeutic effect, it seems to me, almost to a surgical dusting powder) does its share toward giving permanent results in such cases. The prognosis would not be so favorable, if favorable at all, in a moist climate.

But pause, my brother dentists, and see what we have here. A pus cavity as big as a tin cup, not as big as a pea, as is the ordinary pus cavity at the end of a tooth, infected, not only with staphylococci and streptococci but with the tubercle bacillus also; in one of the most vital organs of the body;

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with the only possible drainage up hill (as a result of pressure)—*and the case is cured, the patient gets well!*

Here certainly I have shown a case "in the whole realm of medicine and surgery" which is treated successfully without surgical operation at the seat of infection.

The purpose of publishing the foregoing is simply to answer a question I have had put to me repeatedly and which I could not answer before.

I earnestly hope that what I have said will not be accepted as an argument in favor of going back to the treatment of teeth. In the face of such facts as I have set forth I am still *afraid of* the pulpless tooth and I want others to be. I still know that the surgical removal of granulomata is greatly superior to any other form of treatment. I still know that the treatment of the teeth as practiced in the past was a tragic failure and that if, after our vacation from it, we are to go back and treat teeth again it should be a new, better, cleaner (and more expensive) kind of treatment. And above all, I still know that the only solution to the pulpless tooth problem is prevention of the pulpless tooth.

"ISN'T IT TOO BAD?"

"Isn't it too bad," a man said to me the other day, "how the laboratories have *commercialized* radiodontia?"

I agree with what the man meant, but I disagree with what he said.

Why is it wrong to *commercialize* a thing? We live in an age of commercialization. Every instinct, desire, peculiarity, virtue and fault of the human race is commercialized.

The minister commercializes the inherent desire of the human being to be decent and go to heaven.

The merchant commercializes our desire to wear pants.

The medical and dental professions commercialize our desire to be healthy.

The theatrical manager commercializes our desire to be entertained.

The undertaker commercializes our desire to be buried.

And so on.

I am able to go to church, wear clothes, get medical and dental attention, go to the theater and get buried because these human needs and desires have been commercialized.

When men deplore "the commercialization of dentistry or radiodontia" what they really deplore is the corruption of these things by dishonesty, pretense, fraud and misrepresentation.

Of course I agree that "it is too bad" that men do not practice a better grade of radiodontia, that they give false, ignorant diagnoses and that they have cut the price for this inferior service until the very existence of the *art* of radiodontia is threatened.

But what I say is speed the day of intelligent commercialization of radiodontia (and dentistry) and quit misusing the words commercialize and commercialism. Anything for which fees are charged and paid is a commercial enterprise. Intelligent commercialization is the fitting of an honest fee to an

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honest service. It is not honest commercialism to sell x-ray negatives and call such service "radiodontic service" or "diagnostic service" and at the same time accuse the few men who are giving genuine radiodontic service of charging excessive fees, when the fact is that such men work for less per hour than the negative vendors.

Putting the right label and price on a thing is sound constructive humanitarian commercialism. A little more of honest labeling in medicine and dentistry could do no harm and would surely do some good.

Radiodontic service may be labeled or designated as follows:

(1) Capable, conscientious diagnostic service for which the fee is based on time consumed and the number of regions examined and the operator assumes the responsibility of making as many negatives as necessary.

(2) Photographic service for which the fee is based on the number of negatives made, such negatives being made at standardized angles.

There is no particular objection to the second class of radiodontic service when it is properly labeled, except insofar as it threatens the existence of the higher type service by its cheapness. (It would be a shame for the real art of radiodontia to die the victim of competition for cheapness, as amalgam and rubber plates died, and have but barely shown signs of regained life these last few years.) But when the practitioners of the second class of radiodontic service pretend also to give reliable diagnoses, giving their diagnoses from *one* negative where *three* should have been made, without pulp testing, and without the studied deliberate consideration of both negatives and collateral evidence so necessary to intelligent conclusions—then there is objection to such practice. Then it is that we have what is commonly called commercialism. But it is not commercialism at all, it is corruption and dishonesty.

RADIOGRAMS

A RADIOGRAM is a wireless message.

* * * * *

A RADIODONTIC examination of any region may be described as one wherein the x-rays have been made to give as much diagnostic information as they are capable of giving.

* * * * *

A SET of ten negatives, such as is so widely used, should be looked upon as a sort of an x-ray *glance* at the mouth. To have an x-ray *scrutiny* of the mouth *begin* with fourteen negatives.

* * * * *

VIEW light negatives by sky light or reflected white light; view dark negatives by strong artificial light; view all negatives in the light of the knowledge that they are only shadows.

* * * * *

THE best stuff I have read recently about radiodontia has been that written by a fellow named Simpson.

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A MAGAZINE now before me and opened to the advertising section reveals a nice looking young lady with winsome silk stockings in the act of biting an x-ray machine. Dear Dr. Simpson: Why does the young lady bite the x-ray machine? And when you answer, Doctor, would you mind leaving a little of the hide on?

* * * * *

D. P. N. says that a fellow from back in the sage brush wrote to the supply house asking for bigger films, explaining that the ones formerly supplied were not large enough to enable him to get the ends of the roots.

* * * * *

SOME dentists are beginning to say: "I'm not afraid of pulpless teeth." Auh, aw, look out. The victim is never afraid of the gun he thought was not loaded.

* * * * *

A CERTAIN prominent dentist has been giving lectures over the country and showing radiographs of pulpless teeth, treated quite a number of years ago, which teeth show no evidence of periapical osteoclasia. The insinuation seems to be that these teeth were treated correctly at that time. Of course the mere fact that the teeth show no evidence of periapical osteoclasia only indicates that the teeth were possibly or probably treated correctly; it does not prove it. And wouldn't it be better to admit that if we treated any teeth correctly in the past it was only "by the grace of God," a sort of an accident? If we are to go back to treating teeth, the first thing to do is to admit that the treatment of the past was wrong. This will lead to a search for a new, a better, cleaner, more intelligent, more scientific (more expensive) kind of treatment—*and little of it.*

* * * * *

NOT long ago I made a man very happy, and he made me happy. The man directed my attention to a printed mistake I made several years ago. It made me happy because it gave me the opportunity to correct the mistake. It made the man happy because he doesn't like me very well anyhow.

* * * * *

WHENEVER I use the word radiograph as a noun and submit the work to this magazine I find the word changed to radiogram. But when I use the word radiographic it is not changed to radiogramic. Why not? Of course "radiogramic" sounds silly, but if the word radiograph as I use it is wrong, so is radiographic.

* * * * *

ALSO why call a magazine a Journal of *Orthodontia,* Oral Surgery and *Radiography?* Why use the word orthodontia and reject the word radiodontia?

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Success before Service

Q. Will you teach one of my young lady assistants radiography? I have a complete plant, but to successfully run the largest practice in this section I must have the girls do the x-ray and laboratory work.

A. Thanks for the compliment but it cannot be done. An assistant (presumably one without the necessary fundamental knowledge and special training for the practice of dentistry) cannot be taught radiodontia. She may learn to develop films, to manipulate a machine, and to make x-ray "pictures," but she has not the qualifications to make a radiodontic examination. As you have observed, she may learn to mix amalgam, manipulate a dental engine, and polish teeth, but she has not the qualifications to diagnose a case or practice dentistry.

When you employers of "piece-workers" learn that radiodontia consists of much more than films and fees, your patients will begin to derive the great benefits from radiography which your present system will never yield. If your practice is too large for you to do the x-ray examinations and that portion of the laboratory work which should not be entrusted to an unlicensed assistant, why not get a competent associate. True, you would have to share your income or pay a larger salary than the "girls" command, but you would have more self-respect and a better record in the final accounting. A professional practice cannot be conducted like a shop (sweet or sweat) without impairing the service; and quantity production schemes announced for the benefit of the needy, usually operate for the benefit of the needy doctor.

Your reference to the "plant" and successful practice invites discussion of this growing tendency to pageantry and chicanery in dentistry. Your words unmistakably proclaim that you have one of those cunning catalogue offices with a "cuckoo-window" in the reception room where the "birdie" pops out, an illuminated sterilizer display more impressive than your chain of asepsis, some over-stuffed rose or turquoise carpets, a time-stamp, and a special cabinet for drinking glasses. Have your operations improved like the "old stand"?

The greatest travesty on dentistry as a scientific profession is an ornate booklet distributed by one of the equipment monopolies which portrays the

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salesman's idea of a successful dentist. It reeks with business psychology, superficial efficiency, and time payment ostentation. It describes lavender scented operating rooms with the daily floral offering, the sales talk with the patient placed at a disadvantage facing the light and below the "psychologist," and the gowned, freshly manicured operator anointed with rose water. The illustrations show a "model" suite combining all the pastel shades of a calciminer's nightmare in a space of 22 x 26 feet divided into ten rooms (?) and a hall, dust collecting valance drapes in the operating rooms, and a marcelled Apollo in a night shirt transilluminating a Venus surrounded by mirrors. The legend writer states "Trans-Illumination * * * is an effective way to enthuse the patient on the influence of good dental work on the general health," which is important if true but as superfluous as the hyphen and capital injected into "transillumination."

By the shade of Oscar Wilde, has dentistry lapsed into an esthetic decadence wherein the vogue is a perfumed rendezvous of sensuous colors, the practice the theatrical trickery of a fakir, and the practitioner a cosmetic addict with a handkerchief in his cuff consorting with man milliners? If drastic steps are not taken to curb the aggression of the commercial interests in their educational (?) campaigns, nostrum hawking, and practice veneering, dentists will soon be subcontracting for them and wearing advertising insignia like refreshment vendors.

That beloved exponent of dental science and ethics, Dr. C. N. Johnson, wrote a monograph on "Success in Dental Practice" which has served as an inspiration and guide to many illustrious practitioners of the present generation. He nobly selected humanitarian service for his theme, and leavened it with sufficient system and business acumen for economic balance without subordinating professional precepts.

Read it, boy, and get back to the principles to which you ostensibly subscribed when you appropriated the accrued knowledge of a learned profession. Then you will not choose to profit from the incompetent operations of an unqualified assistant.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

Orthodontia — Oral Surgery — Surgical Orthodontia — Dental Radiography

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Encephalitis Following Extraction of a Tooth with Infected Apex. H. A. Potts (Chicago). The Dental Summary, June, 1922, xlii, 6.

The patient, a woman of forty-two, consulted her family physician on November 12, 1920, for vague symptoms—nervousness, palpitation, dyspnea, and slight trembling on exertion. The condition had existed several years and she had lost flesh. Physical examination was chiefly negative, but an x-ray of the teeth showed several apical infections and it was proposed that these teeth be extracted. An upper right second bicuspid was taken out on November 26. There had been no symptoms, aside from the x-ray shadow, to inculpate this tooth, and the granuloma came away with the latter. Local anesthesia was employed and the extractor was a careful and competent dentist. There at once followed a syndrome suggesting surgical scarlet fever which, however, was excluded by the course, the rash soon vanishing. By December 4 the temperature had become normal, the leading symptom being soreness of the nuchal region. This was succeeded by a general convulsion lasting 10 minutes, opisthotonus and a sudden rise of temperature to 106°. Lumbar puncture was negative. Patient became delirious and comatose but rallied and by December 8 seemed out of danger. In discussion Blair of St. Louis stated that he had seen a dozen deaths following extraction, but in every case the extraction was done during an exacerbation of acute infection. In the above case the inference is that some of the bacteria had been mobilized at the root of the tooth and had escaped into the circulation. The picture was of course highly atypical as far as intracranial infection is concerned.

Fifty Years' Observation of Oral Surgery. T. L. Gilmer (Chicago). The Journal of the National Dental Association, July, 1922, ix, No. vii.

The author refers to the rôle of Garretson as the pioneer oral surgeon The latter visualized a course of instruction open alike to the dentist and surgeon, but later developments made this branch of the healing art inseparable from dentistry proper. It represented advanced dentistry and not an

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integral part of general surgery nor a separate surgical specialty. It is abundantly evident that the term "oral surgery" is a complete misnomer, and that the correct expression is "dental surgery." Surgeons exist who limit their work largely to operations on the mouth, face and jaws, and such practitioners often have no dental training, neither does their province coincide with that of the oral surgeon. Another type of the dental surgeon is the man with the double degree who is naturally especially qualified for all surgery involving the oral cavity. A third type is the dentist without medical training who takes up oral surgery. Garretson's successor in the University of Pennsylvania, Professor Cryer, introduced the Bonwill surgical engine for bone drilling, etc., and the principle has been extended to all forms of local bone surgery. The dental surgeon is also responsible for nitrous oxide oxygen anesthesia, and in part for the ether vaporizing apparatus; and again for the suction apparatus for removing blood from the operating field. Dental surgeons are also to be credited with the best modern technic for treating fractures of the jaws and for standard cleft palate operations. So-called surgical orthodontia is not an outgrowth of dental surgery but the credit or discredit of it should be awarded to the extraction specialist. The dental surgeon, odd to relate, is not a sponsor for this practice and is even distinctly opposed to it when there is any possibility of disseminating the infection.

Oral Surgery, A Department of Gastroenterology. J. W. Draper (New York). Reprint of an article in the Medical Record, March 11, 1922.

Medicine having subdivided indefinitely into specialties, a countermovement in the direction of integration will eventually be inevitable, and some of the narrower special fields will be regrouped to form larger ones. The author points out that rectal specialists no longer limit themselves to the rectum, while exclusive stomach specialists have also passed out. Both types claim the intestine, for the small intestine originally claimed by the gastroenterologist can hardly be thought of apart from the colon, while the rectal man will hardly stop at the colon. The stomach man has long claimed the esophagus as part of his field and it seems inevitable in the author's viewpoint that oral surgery must eventually be absorbed in one grand field which embraces the entire alimentary canal. There are some stumbling blocks to this conception. Thus the gastroenterologist has been preeminently a physician or internist, all operations on the gastroenteric tract having belonged to the abdominal surgeon. He has been interested in curing diseases by nonsurgical means, and the surgeon is his competitor. The proctologist on the other hand is essentially a surgeon who dips at times into abdominal surgery—colostomies and the like. Abdominal surgeons have in many cases absorbed much of the knowledge of the medical gastroenterologist, and by the aid of the chemist and radiographer can make their own diagnoses of gastric disorders, but the reverse is much less frequently seen and the man who begins as a gastroenterological internist will hardly evolve into an abdominal surgeon. The author thanks the progressive dentist for the sup-

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port of his own thesis and even seems to give him credit for priority in the demonstration of the fact that dental pathology is interlocked with the pathology of the stomach and colon. For years he has been curing intestinal maladies by treating the mouth and antrum. While the evolution of the teeth was a step of great importance for the welfare of the body at large a new crop of diseases resulted and this dualism for good and evil is seen in all evolutionary advances; so that if we wish to grasp the nature of disease we have chiefly to study these advances intensively. The diseases in this instance are of the infectious type with especial reference to the activity of the familiar exciters of suppuration. They are due to a break in the natural defenses. The teeth enable us to utilize as foods many hard and raw articles of diet but they facilitate ordinary infection. According to the author all benefits derived from mastication are far inferior to the damage done by oral infection. The tonsils, believed to be an integral part of the lymphatic line of defense against entrance into the blood of microorganisms themselves often suffer directly, and moreover a certain amount of toxemia and infection is not prevented. The colon through a variety of accidents, due in part to assumption of the upright position and in part to sedentary life, becomes a third alimentary canal source of infection and toxemia, and in many cases there is neither pain nor fever nor any other familiar symptom to point towards the source of the mischief. It is this element of focal infection which brings together the various segments of the alimentary canal in one special discipline of surgery and to the preceding the appendix and gall bladder could doubtless be added.

Unity of the Different Forms of Paradental Cysts. Delater and Bercher (Val-de-Grace). La Revue de Stomatologie, May, 1922, xxiv, 5.

The authors relate in detail seven cases of paradental cyst and reach the following conclusions: There is evident a relationship between the malpighian epithelium of Case I and the adamantine epithelium of Case III, while in Case II both types are seen in the same cyst. The paradental epidermal debris is very probably the same tissue at different stages of development. In Case III the cells which spring from the embryonal epithelial layer have reached the age of the cells of the adamantine organ, while in Case I development of the same cells has been checked by the appearance of the process ending in cyst-formation. In Case II some of the cells had their growth arrested while others went ahead to the adamantine stage. The common origin of the two types of cell had already been noted by Roussy and Leroux in their work on the diagnosis of tumors and also by Chibret. The former authors state that both dentigerous and nondentigerous cysts are constituted of star-shaped malpighian cells and Chibret explains the differences by the intercurrent development of a tumor during the normal evolution of the cells.

In other words all paradental cysts have a common origin in epithelial tissue. Coryllos, it will be remembered, also regarded paradental cysts as simple fluid adamantinomas. The paradental cyst then is of malpighian, adamantine or mixed epithelial origin, while a transition may be seen be-

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tween the adamantine layer and the anarchic invasion of the wall suggesting epithelioma. Finally the paradental cyst may be infected and undergo inflammatory cystic degeneration.

Is Sugar the Main Cause of Dental Caries? A. Parlin (Chicago). The Dental Cosmos, July, 1922, lxiv, 7.

This question cannot yet be answered intelligently and will not be so answered until special research has been instituted. The sugar hypothesis of the cause of caries is of course part of the larger problem of carbohydrates and caries. It is easy to demonstrate that caries increases with the per capita increase of sugar consumption, but this argument may be highly fallacious. Every dentist may contribute something by studying his own patients from this angle. He might use cases in which there is very slight consumption of sugar to control those in which sweets are eaten in moderation or excess. If we find plenty of caries in those who ignore sweets the fact would be of great significance. In studies of caries from this viewpoint various elements would have to receive due attention. One is racial, for it is known that caries is very largely a white man's disease. That negroes may constantly eat sweets and not develop caries is due chiefly to the fact that the negro, especially in a primitive state, is relatively and racially immune to this disease: although he can acquire it by following closely the white man's mode of life. Another factor is the spontaneous tendency of caries to undergo relative arrest after childhood and adolescence have passed. The problem would therefore have to be studied in relatively early life.

Pyorrhea Alveolaris. Scherbel (Leipzig). Zahnaerztliche Rundschau, May 23, 1922, xxxi, 20.

The author quotes the view of Roemer that this affection begins with inflammation of the gum, which first destroys the circular ligament, causing the formation of the gum pocket and the destruction of the alveolar process, which is then replaced by fibrous tissue. Pyorrhea and formation of granulation tissue are collateral phenomena. Others see as the first step in the disease atrophy of the alveolar process and regard the disappearance of the circular ligament as unessential. The author is antagonistic to the practice of studying the pathology of this affection on the cadaver. Only experiments can throw light on its nature, and these must of course be made on animals. The task is a most difficult one and we do not know, at the very outset, whether we have to do with a single disease or group. The latter seems more probable. The possibility of finding a single disease exciter is very remote. Disease, as stated by Hufeland 125 years ago, is made up of two set of phenomena, viz.: the action of causal factors on the organism and the reaction of the latter upon the causal elements. This axiom we too often forget, for what we call the disease is made up of both elements—action and reaction.

Recently two papers appeared which cover respectively the occurrence of the affection in dispensary or walking, and bedridden cases. Both classes

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presented pyorrhea and loose teeth but hardly anything else in common. It is common observation that pyorrhea often disappears as soon as there is recovery from the basic disease, and the latter may be almost any chronic general condition.

Certain Nose and Throat Conditions Allied to Dental Problems. H. M. Hayes (New York). Eye, Ear, Nose and Throat Monthly, July, 1922, i, 6.

Within the past decade there has been noted a marked degree of *rapprochement* between the dentists on the one hand, and the various medical specialties on the other. This is especially the case with the rhinolaryngologist. The war played an important part in the interchange of ideas, and focused and stressed the relationship between general medicine and stomatology. But thus far the dentist is not in touch with general medicine in the sense that the rhinologist is—thus the latter has a Wassermann made about twenty-fold as often as a dentist. The latter is at a disadvantage in cases of unhealed fistula or sinus which are often of syphilitic origin, although only the Wassermann reveals this fact. In regard to the evils attributed to focal infection, the author finds this doctrine just as broad as it is long, or in other words, half the teeth are wrongly removed, and half the teeth undrawn ought to be drawn.

The dentist is often in position to single out the case in which adenoids or enlarged faucial tonsils are a source of mischief and in any doubtful case the presence of enlarged cervical lymphnodes is evidence that the focus should be extirpated. He should not, however, promise too much in these cases, for after removal of these lymphoid structures the subject may show no immediate improvement. It is enough to call attention to these possibilities and leave the rest to time save in certain cases. When there is a continuous recurrence of acute tonsillitis, removal may be positively ordered, and this also holds good if hearing is threatened. In all borderline cases the presence of enlarged cervical lymphnodes may turn the scale. The rhinolaryngologist, on the other hand, has abundant opportunity to urge his patients toward spreading the jaws, although it must be borne in mind that this must be undertaken at a very early age period—usually long before the patient seeks rhinological care.

The Rhodesian Skull. C. E. Johnson (Madison, Wis.). The Dental Cosmos, July, 1922, lxiv, 7.

Discoveries within comparatively recent years of very ancient skulls in various parts of the world should be of special interest to the dentist from more than one angle, but according to the author's experience little or nothing has been found on the subject in the American dental journals. In the South African skull the retreating forehead and prominent supraorbital ridges suggest the ape but the teeth are human throughout and the shape and size of the palate suggest the gift of speech. The maxillary teeth are arranged in a horseshoe pattern and all teeth are badly worn, the anterior

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down to the neck. The incisors occlude end to end as in all primitive skulls. Despite this fact the teeth show signs not only of caries, especially in the molars and premolars, but of pyorrhea or alveolar abscess as well. This skull then differs from the general run, for primitive man has in general been held to be quite free from caries, even up to comparatively modern times—say 2000 years ago. Not much could be learned of the mandibular teeth owing to the imperfections of the skull. As for other ancient skulls the Java ape-man's remains included but a single tooth, a third molar, which is simply classed as primitive with two buccal roots fused; the Heidelberg man has a powerful mandible of mixed human and simian traits and the same may be said of the Piltdown man. Simian characters are also in evidence in fossil men of later periods, but in the Aurignac and Magdalen fossils despite their relative antiquity the teeth are practically human.

On the Relation Between Buccal Infections and Constitutional Disease. H. S. H. Leichtenstein (Munich). Zahntechnische Reform, April 9, 1922, xxvi, 14.

Since a pamphlet by Fisher, the physiologist of Cincinnati, on the above subject, has been translated into German, the German dentists and medical men have shown much interest, the majority regarding the supposed causal relationship as not scientifically demonstrated. The present author concedes the importance of study of the subject which must be based on x-ray findings. The crux of the entire discussion is the answer to the question "Is a tooth with dead pulp to be looked on as practically a sequestrum?" The use of arsenic to devitalize pulp is involved and there is no doubt that the mineral may, through its deep action, not only devitalize the entire pulp but act further by attacking and devitalizing the periodontium through the apical foramen. Total arsenical necrosis of the periodontium is seen almost daily by the busy dentist in connection with extracted teeth. At present we have no way of determining the depth of the action of arsenic. The use of the latter should be cut down in the opinion of the author who mentions as a substitute procedure removal of pulp under local analgesia. This is a common and successful method in dealing with the lower molars. Aside from the overuse or misuse of arsenic and the substitution of direct excavation of pulp under novocain, the subject resolves itself into a matter of ordinary asepsis, in dealing with root filling, etc., and this is desirable in any case irrespective of focal infection possibilities.

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EDITORIALS

The Place of Orthodontia in School Dentistry

THE British Dental Journal of April 1, 1922, contains an original communication under the above title written by R. Weaver, School Dentist to the County Borough of Derby. The article contains many points of interest, some of which we agree with; other statements we are not sure we understand. Whether we entirely agree with the author of the article or not, it is being published in full in this issue of the Journal, because it deals with conditions which will have to be considered sooner or later in this country.

We are all agreed that orthodontia has a certain place in the school clinic, as such clinics are being organized in this country. It seems as though the British Government is also approaching the relation of dentistry to the people in some manner similar to the school clinics that are being established

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here. Just exactly what the relation of orthodontia to school clinics will be, is a question difficult to decide. We are aware that there are an increasing number of people who believe that medical and dental services should be paid for by the state. Just exactly how far this socialistic view should be carried and to what extent the public health movement should be backed by the government in relation to the general public are problems that will have to be solved in the future.

There is no doubt that the people are entitled to a certain amount of public health service, also a certain amount of dental attention in the school clinic. However, we are not convinced at the present time that all kinds of dental operations should be performed in school clinics, including the most expensive types of dental restorations as well as the correction of all types of malocclusion.

There is no doubt but that certain cases of malocclusion should receive attention, and information relative to the orthodontic needs should also be given. At the present time, however, and probably it will be many years before conditions will be different, it is impossible to treat all types of malocclusion that are seen in the public school clinics. We have never had experience in public school clinics, but we have come in contact with the public through our association with orthodontic clinics in dental schools. There is a certain class of people who realize the value of orthodontic services, who try to convince us they are entitled to a consideration. In other words, if it were possible, they would insist the public bear the burden of having orthodontic services rendered to their child. There is no denying that a case of malocclusion makes the teeth more susceptible to caries and also does not allow the child to masticate properly. Realizing all of this, we must remember that the amount of time and expense necessary to correct the average case of malocclusion makes the treatment in the public school clinic an absolute impossibility.

In the dental college clinic, we meet a certain class of individuals who appreciate the importance of orthodontic service and realize that the correction of malocclusion will result in great facial improvement. We learn that some of these people have consulted private practitioners and have found that the correction of the malocclusion would entail considerable expense. They then try to make the dental college clinic carry that personal burden. These people are probably the same type Mr. Weaver has referred to in his article in the *British Dental Journal.* They seem to believe that the public owes them a certain consideration. In other words, that medical and dental services should be paid for by the commonwealth, regardless of the fact that we find these individuals dressed entirely out of keeping with people who are expected to receive a charity. In instances investigated, we find they are engaged in profitable businesses and receiving incomes much larger than a great many men engaged in the private practice of dentistry.

The present dental college clinics are not run as charitable organizations, but as teaching institutions, consequently it is our belief that in a dental college clinic only such cases of malocclusion should be treated or

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attempted as are necessary in the proper instruction of the subject. The conducting of an orthodontic clinic in a dental college for the purpose of financial gain or in order to see how many cases can be treated or with the idea of making a charitable institution is entirely wrong. Coming, then, to the public school clinic, it is almost impossible to take care of malocclusion because of the necessary time involved and the expense which would make it prohibitive on the part of the commonwealth.

A public school clinic supported by the Board of Health or the Board of Education should not attempt to treat any case of malocclusion, even such malocclusion as suggested by Mr. Weaver in his article. It is our opinion that advice only should be given the parent. It is undesirable even to treat extreme cases of facial deformities in a public school clinic because of the change of management in such a clinic, plus the fact that the patient is liable to change location before the case is completed.

Orthodontic privileges paid for by the commonwealth are absolutely impractical. The expense necessary for the correction of a case of malocclusion would be so great as to be entirely out of proportion for services rendered in other lines of public health from which a greater number would derive benefit. In making this statement we do not belittle the benefit of orthodontic treatment, but we know from experience that the expense involved would be much greater than would be concurred by providing health service to a great many more individuals in other departments. It was found by actual experience in a large nose and throat hospital where an orthodontia clinic was held a few years ago that it cost as much to render orthodontic services to one individual for a year as it did to treat forty cases suffering from adenoids and diseased tonsils. As a result of this disclosure, the orthodontic clinic was discontinued.

Public school clinics should devote their time to giving information regarding orthodontic treatment, calling the parent's attention to what should be done rather than attempting to render actual orthodontic service. We also believe that such treatment as suggested by Mr. Weaver in his article would, in the majority of cases, be a detriment; the child would be much better if no such type of treatment was attempted. The problem is one which will come up for a definite solution and will have to be met in the near future in our own country.

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ORTHODONTIC NEWS AND NOTES

American Institute of Dental Teachers

The Thirtieth Annual Meeting of the American Institute of Dental Teachers will be held at Creighton University, Omaha, Nebraska, Hotel Fontenelle, headquarters, January 22, 23, 24 and 25, 1923.

A cordial invitation is extended to all persons interested in dental teaching. A. H. Hipple, President. Abram Hoffman, Secretary, 381 Linwood Ave., Buffalo, N. Y.

Institute of Oralogy

Out of town members of the medical and dental professions are extended the privilege of the Institute of Oralogy offices, 587 Fifth Avenue, New York City, for consultation and examination of any of their visiting patients.

The Tennessee State Dental Association

The Fifty-Sixth Annual Meeting of the Tennessee State Dental Association will be held in Nashville, Tennessee, May 2, 3, 4 and 5, 1923, with headquarters at the Hermitage Hotel. A clinical and scientific program of unusual interest is being arranged. O. A. Oliver, President. Joe Minor, Secretary, Lambuth Bldg., Nashville, Tenn. J. W. Winn, Chairman Program Committee, Lambuth Bldg., Nashville, Tenn.

American Academy of Applied Dental Science

The Fourth Annual Meeting of the American Academy of Applied Dental Science will be held at Miami, Florida, January 8, 9, 10 and 11, 1923.

All ethical students of progress in both the medical and dental professions are invited to take this short course in Oralogy-Health Dentistry. Papers, clinics and some educational classes free.

For information write Convention Headquarters American Academy Applied Dental Science, Congress Building, Miami, Florida, or Chamber of Commerce, Miami, Florida. Dr. H. L. Madison, Cor. Sec., Burlington, Ia.

Notes of Interest

Dr. Harry L. Hosmer announces the removal of his offices to 1211 Stroh Building, Detroit, Mich. Practice limited to orthodontia.

Dr. Barney B. Kennedy announces after November first his practice will be limited to orthodontia, 509-11 Century Building, Jackson, Miss.

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ORIGINAL ARTICLES

ESSENTIAL FACTORS IN THE USE OF MODELING COMPOUND AS AN IMPRESSION MATERIAL FOR THE ORTHODONTIST*

By James David McCoy, M.S., D.D.S., F.A.C.D., Los Angeles, Calif.

Professor of Orthodontia, College of Dentistry, University of Southern California, Los Angeles, California

Accurate models of the teeth and their adjacent tissues are as important to the orthodontist as to any other practitioner of dentistry who is compelled to reproduce in artificial form these structures in the same size and relationship as they exist in the mouth. Such models can of necessity only be produced from impressions in which the material has been in even contact with all parts to be reproduced and can be removed from this relationship in such a state that the mould produced truly and accurately represents the original.

Owing to the irregular arrangement of the teeth as well as the various degrees of malformation of the adjacent alveolar structures found in the majority of cases of malocclusion, it has been commonly taught that plaster of paris is the only material which can be made to fully meet the requirements of an impression material for the orthodontist. This idea has become so firmly fixed in the minds of many that they look with disapproval upon the use of other materials. Their arguments and protestations might have more weight were it not for the fact that men in other branches of dentistry requiring equally if not more accurate models than the orthodontist, have turned to the other materials without loss of accuracy or without loss of efficiency in

*Read before the June Meeting of the Southern California Section of the Pacific Coast Society of Orthodontists.

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their final results. The writer refers to the use by prosthetists of modeling compound.

While the belief among this class of operators shows a variance of opinion, a sufficiently large number of well-known men have demonstrated its advantages by their results in practice so that its fitness is no longer questioned. If this is true in a field where the degree of accuracy of the impression governs to a large extent the success of the finished product, is the orthodontist illogical who seeks to make this material fulfill his needs? Surely not, if it has advantages of special significance to him in his work and it is the opinion of the writer that we may with all justice so regard modeling compound.

That plaster of paris is not a pleasant material to use in the mouth must be admitted by all. *Inasmuch as the orthodontist is dealing almost entirely with young children and as the obtaining of impressions is usually one of the first procedures of treatment, it would seem logical, all other things being*

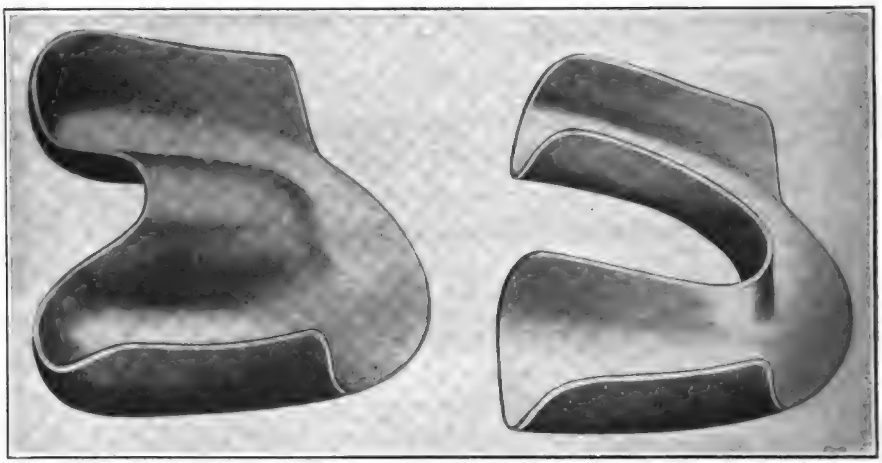

Fig. 1.—Impression trays especially adapted for the use of modeling compound. No attempt has been made by the designers to patent this or other appliances developed by them as they do not believe it to be in keeping with true ethics of dentistry to do so.

equal that the least obectionable means possible should be employed for this work.

If any practitioner will go to the trouble of taking two sets of impressions of several children's mouths, using plaster of paris for one and modeling compound for the other, and will then ask each child which was the least unpleasant, he will find that modeling compound will receive the vast majority of votes. This fact alone should be sufficient to elicit the interest of the orthodontist in this material and stimulate his desire to master a technic which will make possible its more frequent use.

It has still another advantage which is worthy of mention, namely, after the impressions are obtained the work of making the model is rendered far less laborious and difficult than where plaster is used for the impression material. Most busy orthodontists do not attempt to pour, separate, and trim their own models but have this phase of the work done by the assistant,

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and it will be found that the average assistant will handle model work better, more expeditiously, and with vastly less effort when this material is used in preference to plaster.

One of the chief causes of prejudice against modeling compound as an

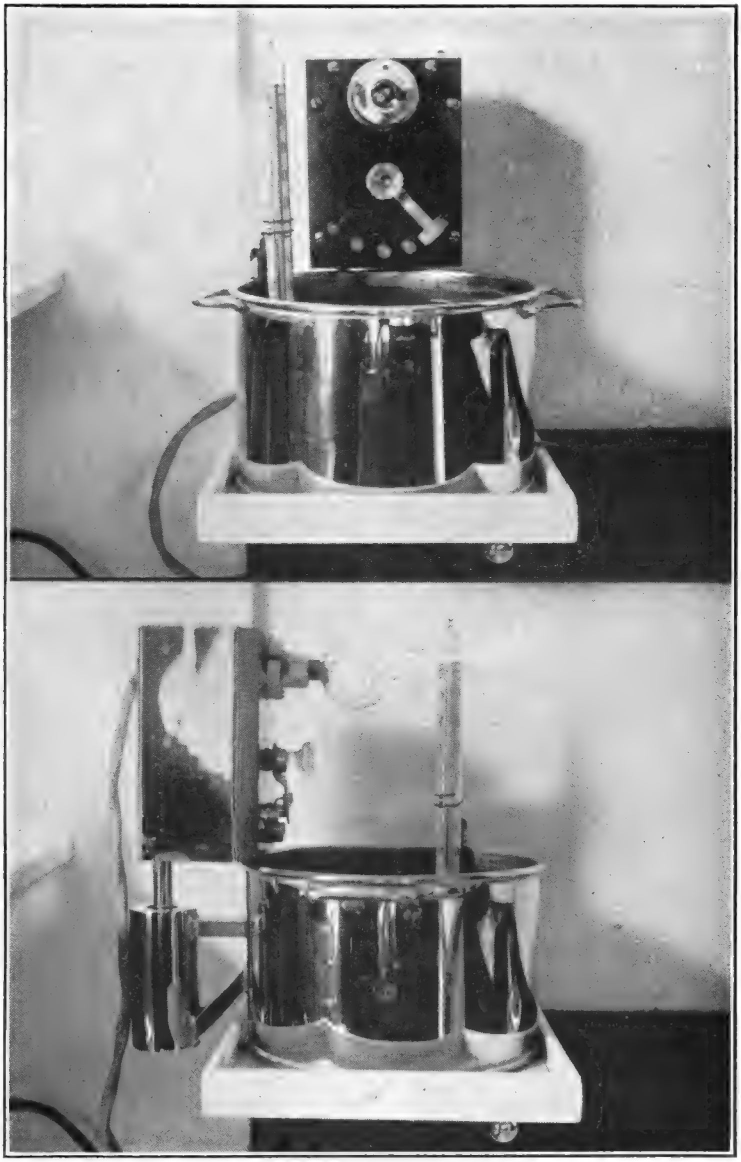

Fig. 2.—Apparatus for heating modeling compound, consisting of an electrical heating unit connected with a water vessel. The electrical unit is immersed in a separate chamber from that in which the compound is heated. This apparatus was designed by Dr. George M. Hollenbach.

impression material for the orthodontist is due to the fact that in many instances where it has been employed, *the technic used was not favorable to successful results because the peculiar requirements imposed by maloccluding teeth were not taken into consideration.* Consequently the models produced

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under such conditions frequently showed distorted teeth and other evidences of inaccuracy and therefore were well deserving of the condemnation they received.

Such shortcomings however are not necessary provided proper methods are employed. In outlining a technic, the author ventures the opinion that anyone who is willing to carry out the suggestions in detail will after a little experience be gratified with the results. The most important factors of this technic may be enumerated as follows:

First, the use of a suitable tray.

Second, the proper preparation of the impression material.

Third, the careful handling of the material while in the act of taking the impression.

Fig. 3.—It is advantageous to have the heating apparatus placed within easy reach of the operator. This shows the plan utilized by the writer.

THE USE OF A SUITABLE TRAY

The ordinary plaster impression tray is quite unsuited to modeling compound and should never be used with this material. For this purpose, after considerable experience in trying various trays, the writer and his associate, Dr. J. R. McCoy, finally developed the impression trays shown in Fig. 1. They are made of aluminum and are not supplied with a handle of any sort. The sides are high but the front portion is cut out sufficiently so that when the tray is put in the mouth, the sides will only extend forward to a point just posterior to the canine eminence. When placed in the mouth, such a tray will bring the modeling compound under pressure in contact with all

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portions of the dental arch except the labial area which corresponds to the cut-out section of the tray. This portion is obtained subsequently after the impression of the balance of the arch has been secured as will be explained later on.

THE PROPER PREPARATION OF THE IMPRESSION MATERIAL

The proper preparation of the impression material constitutes one of the most important steps in the use of this method and careful attention to this phase of the work will soon become apparent in the finished impression. *In order to get satisfactory results from the use of modeling compound, it must be properly heated and manipulated. This necessitates the use of water heated as uniformly as possible, with the temperature judged by means of an accurate thermometer.*

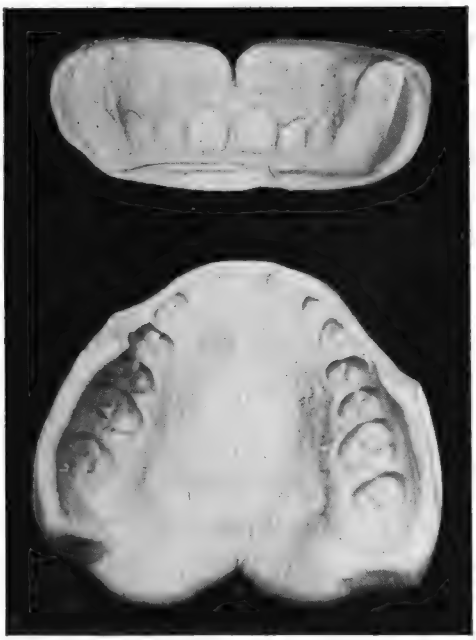

Fig. 4.—This shows the main portion of the impression after it has been cut back. It also shows the labial section which has been made with the main portion in place upon the teeth.

Perhaps the most convenient manner of heating the water is obtained by the use of an electrical heating unit, several types of which are available. The author has found the apparatus shown in Figs. 2 and 3 to offer decided advantages over anything else coming under his observation and experience. It consists of an electrical heating unit connected with a water vessel holding approximately one quart. The electrical unit is immersed in a separate chamber from that in which the compound is heated, which provides among other things a circulation of the hot water in such a manner as to favor a more even degree of heat between the top and bottom of the solution.

The resistance in the heating unit is controlled by a little rheostat and the temperature of the water is judged by the use of an accurate thermometer as shown in Fig. 2 At the bottom of the heating vessel, a smooth porcelain

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dish is provided to keep the compound from sticking to the metallic dish during the process. This may be easily removed and cleaned if the material adheres to it.

The impression material is placed in the water with the temperature at the bottom of the vessel as registered by the thermometer at 130° Fahrenheit.* As soon as it is softened it is removed by the assistant and manipulated, being placed back in the water as frequently as is necessary. The surface water is always from five to ten degrees hotter than the water at the bottom of the dish so that as the compound is carried through it, its softening is hastened by this greater heat. When reduced to a soft pliable state, it is placed in the impression tray, care being exercised not to use more than enough to evenly fill the tray, as an excess of material will prove a hindrance rather than an advantage. The filled tray is then placed over a Bunson flame for an instant, the surface compound being exposed to the heat, is re-dipped into the water of the heating vessel, and is then carried to place in the mouth.

Fig. 5.—The completed upper impression.

HANDLING THE MATERIAL DURING THE ACT OF TAKING THE IMPRESSION

When the tray with its contents has been brought to the desired position in the mouth, *it should be held firmly in place until the compound can be chilled.* This may be accomplished either through the use of compressed air, or cold water directed against the tray from a suitable syringe. This latter method is preferable but if used, a saliva ejector must be employed to carry away the water. *Under no circumstances should* an attempt be made to remove the tray from the mouth until the material has been thoroughly chilled. When this has been accomplished, the tray with its contents is worked off of the teeth, care being exercised to remove it evenly from all parts of the mouth rather than to pry it away from the front, sides or back.

By carrying out the preceding details (in the case of the maxillary arch) an accurate impression is obtained of all areas with the exception of the labial portion lying between and usually including the canine teeth. Upon

*The temperature to be used must of necessity depend upon the product used. Different manufacturers specify the degree of heat giving the best results with their individual products and their instructions should be followed.

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the removal of the impression, the borders of this inaccurate portion are cut back with a sharp knife to a point where the impression is good, a sharp line of demarcation being made. In making this cut, it is well to start at one side cutting from the top to the bottom and following along the incisal edges of the canines and incisors. See Fig. 4. It is important that the posterior part of this cut-out portion of the impression should extend backward at least beyond the canine eminence. If this is not done, the impression will bind and pinch the tissues when it is put back in the mouth for the addition of the labial section.

When the necessary trimming has been completed, the impression is slipped back in the mouth and should go to place without any discomfort. While being held firmly with the index finger of the left hand pressed against the vault of the tray, the upper lip is lifted and a small amount of the compound is adapted against the anterior portion of the arch, the lip

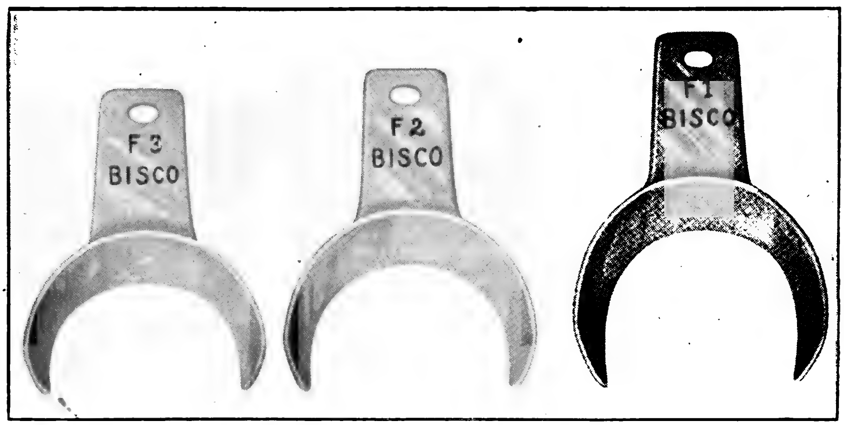

Fig. 6.—Impression trays for closed bite study models.

being lifted for this purpose. This done, the lip is then allowed to come in contact with the impression material and gently massaged against it to insure even contact against the alveolar structures and teeth. This portion of the material is then thoroughly chilled with compressed air or cold water. This accomplished, it is then removed separately from the main impression after which the tray and main impression are taken out. See Fig. 4.

These two sections of the impression are then fitted together and if the work has been properly carried out will go together and show no overlapping edges. When the proper relationship is established, the modeling compound should be fused at several points with a hot instrument so that the union may be permanent. Fig. 5.

The same procedure is carried out in taking the impression of the mandibular arch. This is usually accomplished with less difficulty than is encountered with the maxillary arch and for this reason the temptation often arises to take the impression all at one time rather than resort to the sectional method. This should not be attempted as it will almost invariably

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bring about inaccurate results which will be chiefly characterized by distorted impressions of the anterior teeth.

While impressions of the majority of cases may be obtained through the use of the trays already described, there is always the possibility of cases occurring in which the character of the deformity may require that the impression be taken in more than two sections. Such cases can still be taken in modeling compound by using a "Supplee Tray" and making the impression in three or more sections or if need be in these rare cases, plaster of paris may be resorted to.

The writer has already mentioned the element of time in using this mate-

Fig. 7.—Two aspects of a study model impression.

rial. The actual time spent in taking a compound impression using this technic probably exceeds that which is necessary when plaster of paris is used but even so, the matter of time is not a serious consideration as this technic may be carried out to the very letter and satisfactory impressions obtained of both the maxillary and mandibular arches with the total amount of time spent not exceeding fifteen minutes.

In preparing such impressions for pouring, they should first be thoroughly dried out either by compressed air or by allowing them to stand a sufficient length of time, so that all surface dampness is removed and then they should be given a light coat of very thin sandarac varnish. This varnishing is not done with the idea of acting as a separating medium but simply as a means of insuring a better finish to the model surface. After the varnish

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has become thoroughly hardened, the model is poured in the usual way, care being taken to avoid the formation of air bubbles.

IMPRESSIONS FOR STUDY MODELS

In addition to making separate impressions of the maxillary and mandibular teeth and arches as already described, modeling compound can be used very advantageously in taking impressions for closed bite "study models." The indications for such models occur quite frequently in the practice of any orthodontist, they being especially indicated in those cases where

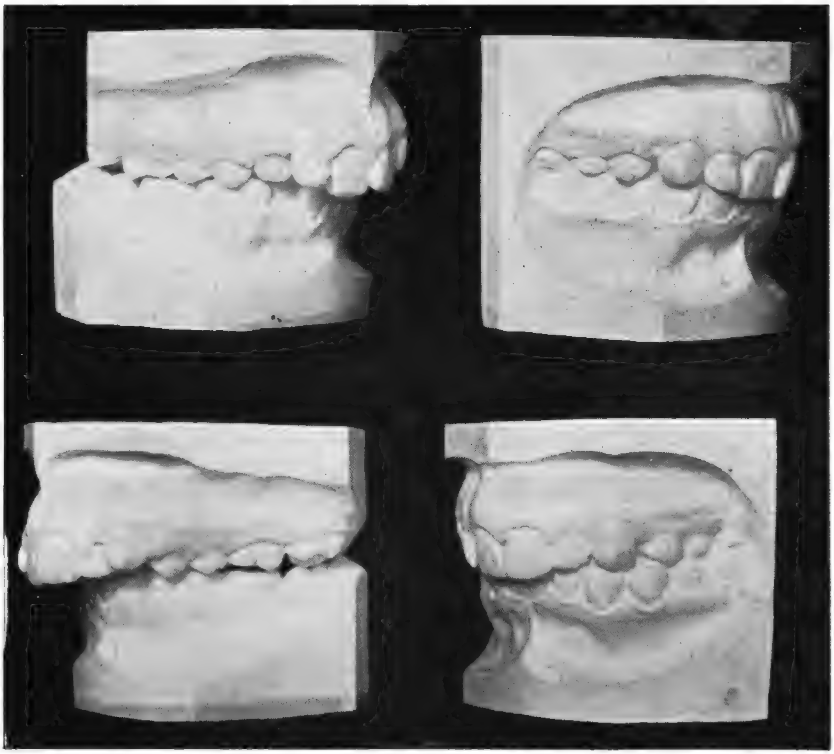

Fig. 8.—On the right are shown progress models made from the impression shown in Fig. 7. These show the results of seven months' treatment.

it is desirable to record degrees of progress in treatment, cases under observation, cases under retention, etc.

In order to render more accurate the taking of such impressions, the author has designed a set of trays shown in Fig. 6. A small amount of the modeling compound is adapted against the tray, care being exercised not to allow it to extend appreciably over the edge of the tray or to be more than one-fourth of an inch in thickness. The patient is instructed to close the teeth in their natural resting occlusion and the tray is inserted and pressed against the teeth, the lips being parted for this purpose. The tray with its contents is held firmly in position until the material has become chilled. The patient is then instructed to open the jaws slightly and the impression is removed from the mouth. In Fig. 7, two aspects of such an impression are

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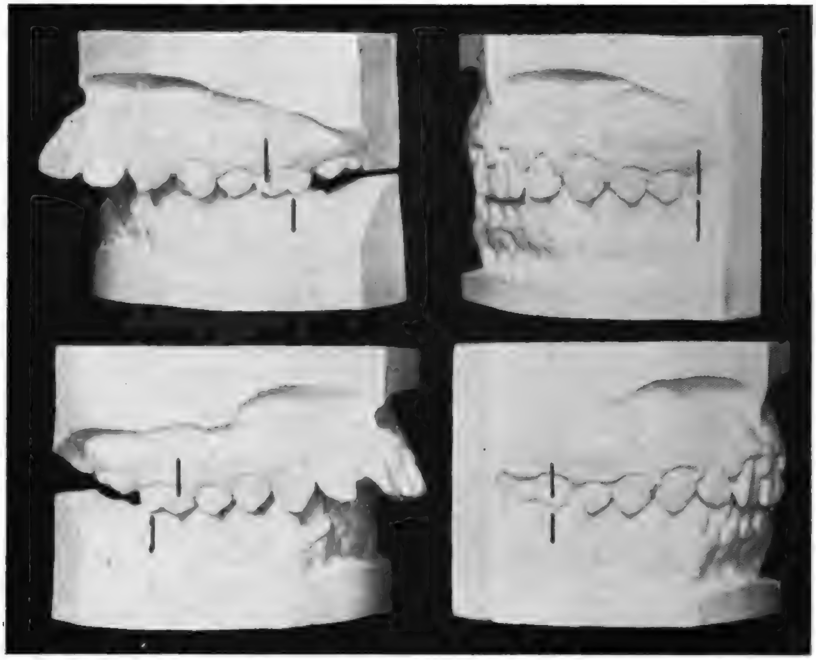

Fig. 9.—The models on the right are progress models showing the results of six months' treatment.

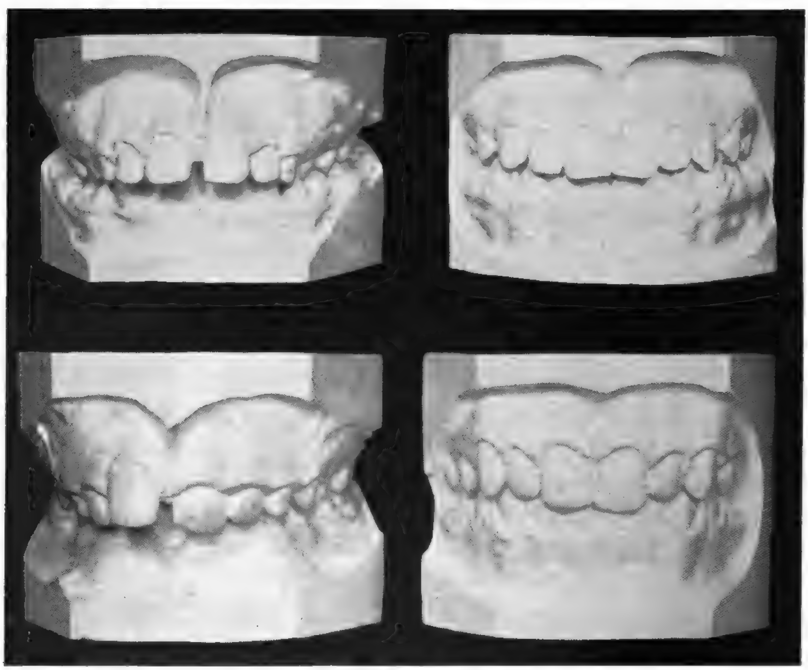

Fig. 10.—Two cases before and after treatment, the models on the right having been made by the closed bite method after all appliances had been removed.

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shown, and in Fig. 8, the progress models made from this impression, show the results of seven months of treatment.

In designing the trays, three sizes have been provided which in the author's experience have very satisfactorily fulfilled the needs of different mouths. In the event a study model is desired which will show the relationship of the occluded teeth from molar to molar, the largest size should be employed or should a lesser area only be desired, a shorter tray will suffice. The handle upon the tray adds materially in properly centering the material about the teeth. It is also a valuable aid when such impressions are poured in guiding the technician in distributing the plaster base. Other examples of models made after this plan are shown in Figs. 9 and 10.

In conclusion, the author heartily recommends modeling compound as an impression material for the orthodontist. This is not done upon superficial experience but after using it constantly for ten years. Those who will go to the trouble of giving it a fair trial, which means using it under proper conditions with strict observance of the various rules governing its use, will find it advantageous; first, because it is less objectionable to our little patients than is plaster of paris; second, because it renders the process of model construction less irksome to the assistant; and third, because with it, beautiful and accurate impressions may be obtained.

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SOME TYPES OF THE FINGER-SPRING USED ON THE LINGUAL BASE-WIRE*

By Martin Dewey, D.D.S., M.D., New York City
Associate Professor of Orthodontia, College of Dental and Oral Surgery

FINGER-SPRINGS have been employed a great many years by Doctor Victor Hugo Jackson as a part of his system of appliances. They have also become an important part of lingual wires both of the soldered and removable type.

The soldered lingual wire when employed with the wire-stretching pliers can be made more efficient in certain types of malocclusion by the employment of the finger-spring.

Fig. 1 shows a soldered lingual wire which has been used for producing expansion of the lateral halves of the arch. As the case progressed the lingual wire in the incisal region was pinched practically as much as it would stand, but the deciduous canines were not moved sufficiently and small finger-springs had to be soldered to the base-wire to produce expansion in the canine region. In adjusting these finger-springs to exert force on the canines, the lingual base-wire can be raised slightly occlusally while the finger-springs are adjusted. The elasticity of the base-wire will bring it back to the normal position.

In raising the base-wire occlusally in adjusting the finger-springs, the base-wire must not be sprung beyond the range of elasticity or it will not go back to its proper position. If it does not resume the proper position after the finger-springs have been adjusted, the efficiency of the appliance will be lost.

Fig. 2 shows an appliance constructed on a model. We have employed the solder base-wire and finger-spring. This case was complicated by three supernumerary teeth, an impacted first maxillary incisor and transversion of the canine and second maxillary incisor on the right side. Our plan of treatment was to move the left second incisor forward and create space for the canine. The right first and second incisors were to be placed in the line of the arch in positions of transversion because the roots of the teeth were displaced as much as the crown, and two supernumerary teeth were impacted in the triangular space between the right anterior teeth. The movement of the teeth mentioned, was preliminary treatment and started to produce a normal development in the anterior region of the arch.

We believed that this development and movement could best be accomplished by the use of the finger-spings with the least annoyance to the patient, realizing, of course, the appliance would necessitate several changes

*Read before the second meeting of New York Society of Orthodontists, February 8, 1922.

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before the case was finished. It will be observed that the finger-spring on the left second incisor contains a loop which can be bent or closed to control the radius of the circle in which the second incisor travels in its forward movement toward the median line.

The finger-spring on the right second incisor is also shaped so the tooth can be moved buccally and distally by controlling the bends that are in the anterior end of the finger spring.

Fig. 3, when studied in conjunction with Fig. 2, shows the construction of the finger-spring which rested against the canine to move the tooth forward and labially. This finger-spring was made of a wire of two dimensions; i.e., a piece of 18 gauge wire was soldered to the molar band which extended forward to the anterior surface of the first premolar. This 18

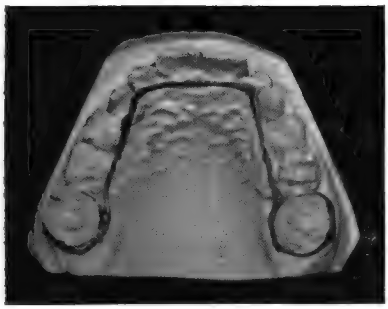

Fig. 1.

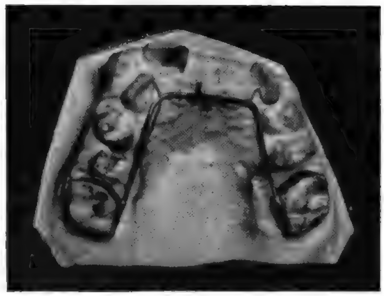

Fig. 2.

Fig. 3.

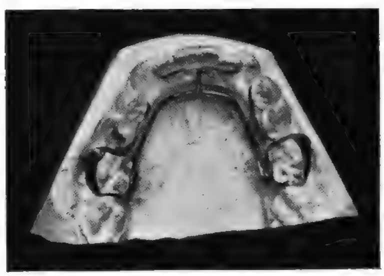

Fig. 4.

gauge wire was used to give rigidity and to prevent the displacement of the finger-spring that pressed against the canine. The loop of the finger-spring was made of 21 gauge wire and could be controlled so as to move the canine in the two directions mentioned; namely forward and lingually.

In adjusting these finger-springs which are attached to soldered lingual wires the operator must have mastered the technic of bending wire or the pressure will not be exerted in the direction he desires. Owing to the trouble that some have encountered in adjusting finger-springs which are attached to soldered lingual wires, the use of the removable type in conjunction with finger-springs has become quite popular.

Fig. 4 shows such an appliance as designed by Dr. L. J. Porter. It will be seen that the lingual base wire is only in contact with the molars, and directly exerts pressure on them. The pressure which is applied to the other

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teeth is derived from finger-springs. It is an advantage to have a finger-spring which is delicate enough to exert only sufficient pressure to produce cell-activity and have the elasticity of the finger-spring sufficient to extend over a considerable range of movement. In attempting to use a long elastic finger-spring on the deciduous molars and canines as shown in Fig. 4, there is a tendency for the finger-spring because of its elasticity, to slide occlusally along the lingual surface of the canine. To prevent this, an extension hook has been soldered on the base-wire to engage the finger-spring and thereby make the finger-spring maintain a fixed position in relation to the anterior portion of the lingual base-wire.

It must be remembered that if the finger-spring is too stiff when held in position by this lingual extension hook, it will still slide occlusally, which of course has a tendency to tip the molars posteriorly. It is necessary that the lingual finger-spring which exerts pressure on the canine and premolar must not be strong enough to displace the molar anchorage. In constructing finger-springs as shown in Fig. 4, on premolars and canines, some have ad-

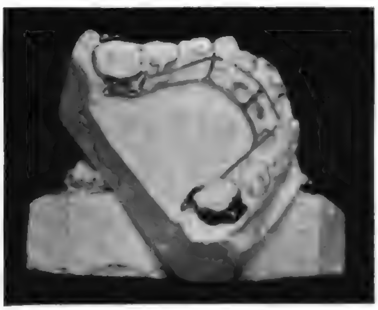

Fig. 5.

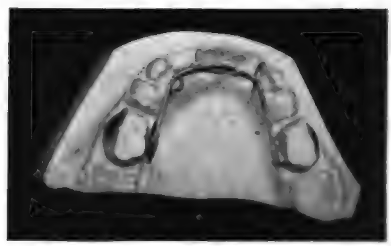

Fig. 6.

vised that the finger-springs should be heavier in the portion that is soldered to the lingual base-wire.

In carrying out this construction, some have made finger-springs from 18 gauge wire and then ground and tapered them down until the wire was of 21 or 22 gauge in the region of the canine and the first deciduous molar. This construction is more difficult to make but gives a finger-spring which withstands the stress of mastication to a much better degree than if the entire length of the wire is made of 21 or 22 gauge.

Fig. 5, in conjunction with Fig. 4 shows the use of a type of finger-spring on the incisors which we have termed "T-bar." The use of the "T-bar" on incisors having malpositions similar to those shown in Figs. 4 and 5, have proved very efficient. This efficiency reaches a higher degree by constructing the perpendicular portion of the T-bar from 19 gauge iridio-platinum. The upright portion of the T-bar which is made of iridio-platinum, can be successfully manipulated with the wire-stretching pliers in such a manner as to increase its length causing the horizontal portion, which is of 21 or 22 gauge wire, to press against the lingual surface of the incisors and the horizontal part of the T-bar is given the shape which the malocclusion

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of the teeth makes necessary. The spring-wire portion or the horizontal portion of the T-bar must rest against the least curved portion of the lingual plane which tends to displace the appliance.

In using finger-springs on removable lingual arches, some have placed the finger-spring gingivally to the base-wire. This plan of construction subjects the finger-spring to less danger of injury from mastication because the finger-spring is protected by the 18 gauge base-wire. Such a construction is shown in Fig. 6, which is a case that required expansion in the canine region and a labial movement of the left second incisor which is just erupting. The finger-springs pressing against the canines differ slightly in shape, and the one on the right side would be the most efficient if a slight posterior movement of the canine was desired, along with the buccal expansion. The finger-spring which engages the right second incisor has the end of the spring bent at right angles so the perpendicular portion of the finger-spring slips under the gum and engages the lingual surface of the incisor that is

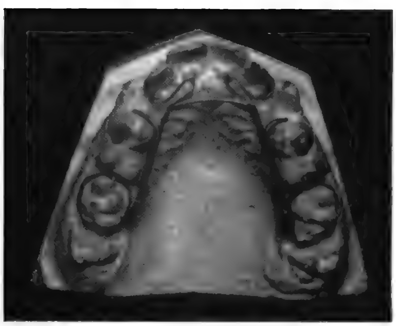

Fig. 7.

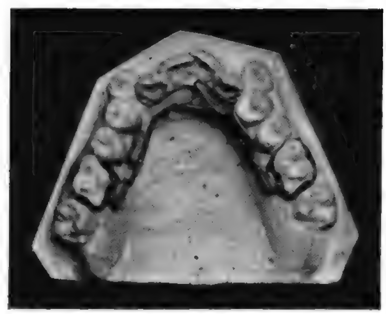

Fig. 8.

erupting. This construction is very efficient in the type of case which is illustrated in Fig. 6.

The types of finger-springs which we have considered so far have been those which possess only a single action or one center of rotation. Fig. 7 shows a double finger-spring or loop finger-spring which has been employed by many men. It is supposed to possess the advantage of having a double center of rotation or double action and is often employed to exert pressure on two or more teeth. In Fig. 7, the finger-spring is so constructed as to exert pressure on the first and second incisor. In fact this finger-spring is a double affair and really possesses two centers of rotation. The portion of the finger-spring extending from the lingual base wire to the first incisor exerts pressure on the first incisor with the soldered attachment at the lingual base wire as a center of rotation. The recurved portion of this finger-spring in the region of the central becomes the central of rotation around which the lateral moves. Of course, in adjusting this type of finger-spring there must be two adjustments or the adjustment of the two arms of the finger-spring, so as to exert pressure respectively on the first and second incisor. As the second incisor moves outward, the loop must be bent to a greater

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extent and as the central moves outward the finger-spring must be swung labially at the point where it is soldered to the lingual wire.

It will be noticed that a finger-spring for expansion extends from the lingual base-wire in the region anterior to the molar to the first premolar and the end of this finger-spring is bent buccally to engage the first premolar gingivally to the mesial contact point. By having this lingual finger-spring bent buccally to grasp the surface of the tooth as described, it acts as a stabilizer to the molar anchorage. The molar cannot tip posteriorly without the elongation of the first premolar. In order that this finger-spring may act as a stabilizer to the molar anchorage, it must be made heavier than the finger-springs which are used for the incisors. This premolar finger-spring when used for anchorage as well as expansion, should be made of 18 gauge wire, which can be slightly ground to reduce the bulk and increase the elasticity. It should be ground only on the buccal or lingual side so as to allow the full width of the wire occluso-gingivally. If constructed in this manner the premolar finger-spring will eliminate the trouble many men have encountered by having the lingual appliance slide occlusally on the incisors and the molars tipping posteriorly.

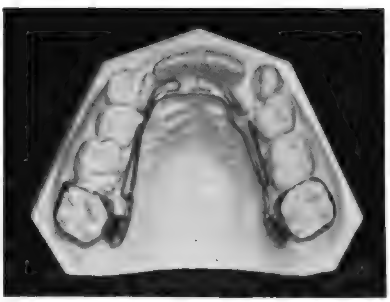

Fig. 9.

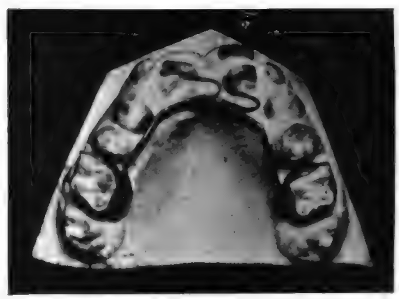

Fig. 10.

Fig. 8 shows a case with a similar appliance as shown in Fig. 7. However, in Fig. 8, the lingual base wire has been placed gingivally, to a great degree, to have as little appliance as possible in the incisal region and allow free space for the tongue during speech. In such a construction as we have in Fig. 8, as the treatment progresses, it will be necessary to reconstruct the appliance, for the incisors and premolars will eventually be moved so far away from their original position that the base-wire will be too small and a new base-wire will have to be made either by reconstructing the appliance entirely or by setting a piece of wire in the incisal region so as to increase the length and width of the lingual base-wire.

Fig. 9 shows an appliance designed by Dr. Porter in which the recurved or looped finger-springs have been employed on the incisors and finger-springs also exert pressure on the deciduous molars, to widen the arch in the premolar region. With this case, as well as the other, it will probably be necessary to reconstruct the appliance before the work is completed.

One of the great advantages of finger-springs is that they can be employed to exert pressure on teeth that are only partially erupted. Such a

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use is shown in Fig. 10, where we have a badly complicated case of neutroclusion, in which the anterior teeth are in a bad position. Everyone knows it would be desirable if a slight pressure could be placed on an erupting tooth. The slight pressure can be employed by the use of delicate finger-springs as illustrated in Fig. 10. It will be observed that the left second incisor occupies a lingual position and by gradual exertion of pressure on that tooth, it can be made to travel towards its normal position. The right first and second incisors are occupying positions of lingual version with the second incisor directly posterior to the first incisor. A finger-spring is employed which passes between these two incisors and by gradually exerting pressure, the first incisor will travel towards the position and the second incisor will have a tendency to follow it.

As the treatment of the case progresses, it will be necessary to change the appliance and add other finger-springs and probably resort to some type of appliance which will produce bodily tooth movement in some of the more greatly displaced teeth.

We have mentioned and described the use of the "T-bar" which is a special type of finger-spring. We find this T-bar can also be employed for

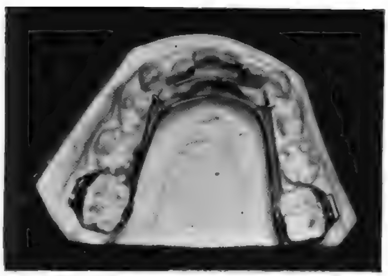

Fig. 11.

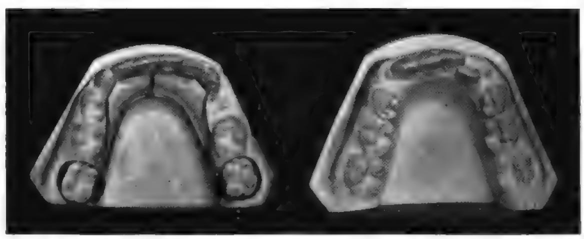

Fig. 12.

expansion in the premolar region as well as in the incisal region. It has the advantage of offering two separate centers of rotation, as well as the principle of wire stretching which can be employed upon the perpendicular portion of the T-bar if made from iridio-platinum.

By studying Fig. 11, it will be seen that the T-bar is soldered to the lingual base-wire and by bending the T-bar forward a rotation center is produced at the point where the T-bar is soldered to the lingual wire. The forward bending of the T-bar will carry the four incisors labially. The outward bending of the T-bar at the point of its attachment of the lingual wire in the molar region will also carry the premolars buccally. This movement of groups of teeth labially or buccally can also be accomplished by bending the perpendicular portion of the T-bar with the wire-stretching pliers. If we wish to exert pressure on the second incisors the horizontal portion of the T-bar which is made from a piece of elastic spring gold wire, can be bent so as to exert pressure on the second incisors and in that case we have a rotation center at the point where the horizontal wire is soldered to the perpendicular wire. The same manner of adjustments can be employed in

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the premolar region so as to cause the first premolar to move buccally more than the second premolar and again the rotation center is at the point where the horizontal wire is soldered to the perpendicular wire.

If we wish to exert pressure upon the canine, the canine can be included in the T-bar that engages the premolar if it is desired to move it buccally. If the posterior corner of the canine is in linguo-version, it can be corrected by having the finger-spring press on it. If the anterior lingual corner of the canine requires labial movement, pressure can be exerted upon it by extending the horizontal bar which is in the incisal region. As we have said before, the canine can be included either in the incisor or premolar T-bar depending upon the type of malposition the canine possesses.

Fig. 12 shows a case of malocclusion and the appliance used in correcting the same taken from Dr. Porter's practice. It will be seen that the T-bar on the incisors has corrected the malposition that existed in that region while the finger-spring in the canine region has taken care of that malposition. The appliance, if properly constructed and manipulated, possesses a high degree of efficiency plus the fact that it is very inconspicuous and is as hygienic as any fixed regulating appliance can be.

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THE RECENT METHOD OF ORTHODONTIC TREATMENT*

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Translated by Margaret Gortikor, D.D.S., New York City

I INTEND to consider the new tendencies in orthodontic treatment and their practical application to the most recent appliances. These tendencies are of two kinds. On the one hand, from a logical standpoint, we now no longer look for the displacement of the crowns of teeth, or even for the displacement of the entire tooth, neither do we look for parallel movement, but we wish to produce a bony growth, the absence of which has been the direct and immediate cause of a majority of malpositions. On the other hand, from a mechanical point of view, the actual tendencies consist of looking for simplicity, strength, and invisibility of the appliance, comfort of the patient, and regard for the laws of hygiene. My instructor, Professor E. C. Kirk, was in the habit of saying that all science was contained in these words, "le pourquoi des choses," which is a free translation of the phrase, "the reason why." I am also going to undertâke to make clear the reasons which favor these actual tendencies, following the two ideas that I have mentioned before.

From a physiological standpoint, as I have already stated, we no longer look for the displacement of the crown of teeth, or of the entire tooth or for parallel movement but we wish to produce a bony growth, the absence of which has been the direct and immediate cause of many malposed teeth. It is needless for me to demonstrate that in a very great number of cases the maxillae have failed to develop normally for the very fact that the first step in all regulating cases has to be expansion, to produce a sufficient amount of space to accommodate all the teeth present in the maxilla, is practical proof and evidence in itself. Now, if to obtain the space, the operator is satisfied to act merely upon the crowns of teeth, he will not produce the profound changes in the bony skeleton, changes which are necessary to produce a result which will be perfect from all three standpoints, namely, function, permanence of results, and esthetics.

What phenomena accompany the application of force upon the tooth by means of an orthodontic appliance? Three results can be produced, and according to the point where the power acts, the tooth becomes transformed into a lever of the first, second or third class gradually as the point becomes displaced.

Example I.—If the power "P" is applied to the crown of the tooth it will become displaced in a direction induced by the power. But it does not turn about an imaginary axis situated at the apex; fixed point "F" will, on

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the contrary, be situated toward the upper third of the root and the last part of the root will form the resistance "R" which is quite weak, moreover. This corresponds to the case in which the old type of expansion arches are used and the tooth acts like a lever of the first class. (Fig. 1.) P—Power. F—Fulcrum. R—Resistance.

Example II.—Let us change the point of application of the power "P" to the level of the necks of the tooth. At the same time we have made the fixed point "F" move to the apex while the resistance "R" will be formed by the entire length of the root and thus we have obtained a lever of the second class. (Fig. 2.) R—Resistance. F—Fixed point or fulcrum. P—Power.

Example III.—Suppose that by skill in constructing the appliance we have changed the point of application of the power "P" to a suitable part of the root, then the entire length of the tooth will form the resistance "R" and the fulcrum "F" will be located at the end of the crown. If we have accurately calculated the height of the point "P," perfect equilibrium of the tooth will be established and displacements in mass or parallel equilibrium

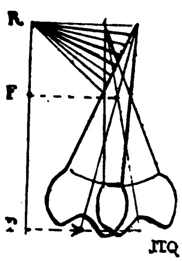

Fig. 1.

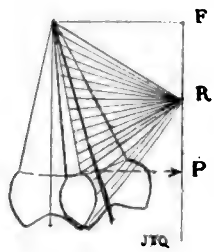

Fig. 2.

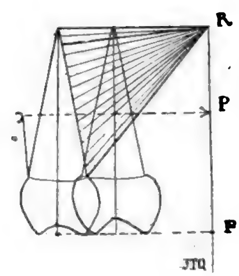

Fig. 3.

will occur, thus the tooth becomes a lever of the third class. (Fig. 3.) P—Power. R—Resistance. F—Fulcrum or fixed point.

This case is met with in practice when certain of Case's appliances are used. The same result is also produced with the use of the transpalatine arch which I will describe later.

What are the changes produced in the internal structure and what ar the physiological differences occurring in bone during the process of displacing the teeth? It sounds learned to say that before the tooth is displaced a rarefying osteitis takes place but after the tooth is displaced a new formation of bone occurs due to a condensing osteitis. This is not true, however, for were it so, the entire alveolar wall would become absorbed during a somewhat lengthy process, which is not the case at all. Arthritis always accompanies rapid displacement, thus we must watch the movement and look out for any unusual sensitiveness on the part of the teeth. It is for the purpose of avoiding these irritating conditions that the Americans have for many years adopted the use of little pressure which is slow but continuous. The peculiarity of this method dwells in the fact that teeth submitted to this process are absolutely painless and also are firm in their alveoli, two points of vital importance, we must acknowledge. Now comes a point which is

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no less interesting, namely, that this slow movement has stimulated the growth of bone in such a way that after the end of the treatment there is practically no tendency on the part of the teeth to return to their former position. If the active period of treatment has been reasonably long, the passive or retaining period, on the contrary, will be notably diminished.

This method offers many perceptible advantages over the old one and these can be summed up in the following way:

1. Slow, physiological action stimulating the growth of bone.
2. Absence of an inflammatory reaction (osteitis, arthritis, pain and unsteadiness of the tooth).
3. The formation of new, normal bone growth in which the teeth are firmly embedded.
4. Reduction in length of time of the retaining period.

These new facts were made applicable only after having overcome difficulties of those who first put them to use. I will not speak of the Case appliance for "contour" which is familiar to all of us, neither will I say anything about Robinson's appliance which to my mind is needlessly complicated and has never been of general use. I only use the first type. There are many forerunners who have opened this field to us and to whom we are thankful for their inventions.

In 1912 Dr. Edward H. Angle invented a new appliance which produced a radical change in orthodontic methods. It was he who was the first to attempt the use of an arch of reduced dimensions having a very slow action. But it was quickly abandoned for it was very complicated. Now, of what was it made and how did it work? Like all of Angle's appliances this one was made stationary by means of anchor bands provided with horizontal tubes of appropriate size and soldered to the buccal surface of the band, but the arch, accurately speaking, was composed of three parts, a median active part, whose square extremities slide into two other parts each of which consist of a nut and screw and which help to fasten the entire appliance into the tubes on the anchor bands. The complexity of this appliance was rendered unavoidable by the manner in which the force was transmitted to the teeth to be moved. Each malposed tooth was fitted with a band, soldered on its lingual surface. This band supports on its labial (or buccal) surface, a small vertical tube into which fits a pin soldered to the middle portion of the arch. Thus, the ends of the appliance fit into the horizontal tubes on the anchor bands while the pins on the middle portion slide into the vertical tubes which, theoretically, ought to be parallel to each other. This is frightfully complicated and so it is understood that despite the advantage derived from being able to produce parallel movement of any tooth, the disadvantages, such as loss of strength to the joints and enormous difficulties involved in constructing it, have made this appliance fall into disuse very quickly.

Angle's most recent appliance was invented in 1917. He claims that as far as simplicity is concerned, it marks a very distinct step forward. This arch itself is no longer made in three parts, but consists of one part which is an invaluable improvement. Then again, its side view is changed, for

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instead of being round, on cross-section it presents a flattened, almost oval, appearance and it is known as a "ribbon arch." Now, as to its means of attachment to the teeth, he still uses the anchor band but instead of the vertical tubes, he used vertical brackets very simple in structure and into which it is easy to place the arch and lock it by means of small pins. However, this appliance is also very complicated and requires great skill to construct and use it satisfactorily.

It is several years now since Lourie first used the lingual wire, not merely as a passive appliance to act as a retainer after the results have been obtained, for that was the purpose of its use for many years, but he makes it the active agent in the treatment. He also uses it in combination with a labial arch which passes quite high up on the gums and has vertical projections which pass downward and rest upon the crowns of the teeth. Then again at other times, he uses the lingual wire alone. This process is excellent in all points but one and that is the arch is soldered to the anchor bands. Thus, the appliance is absolutely stationary and all the adjusting has to be made in the mouth. Consequently the operator works blindly without knowing whether the way in which he used the pliers will produce the desired effect. But, as regards simplicity, upon comparing it with Angle's appliances, it shows so many advantages over them that it seems the operator ought not to hesitate a moment about using it and seeing that in this appliance, the very "ne plus ultra" of simplicity has been attained. Indeed, what can be simpler than having the anchor bands and the arch forming one piece which is strong and cannot be easily bent out of shape?

This arch could be improved upon still more and this was accomplished by Dr. John V. Mershon who made the lingual arch removable by adopting a system of "locking devices" such as Angle and Young have used for other purposes. At the price of a slight complication, he, at the same time, has made allowance for the judicious and variable distribution of available force by means of springs supported by the arch. Here is a detailed description of the structure of the appliance. Firstly, the anchorage which like all the other appliances I have described, is produced by banding the molars, the bands being soldered instead of clamped so as to be of less annoyance to the patient. Then, the anchor tube, instead of being on the buccal surface, is located on the lingual surface (Fig. 4).

The tubes are not horizontal but vertical (Fig. 5 and Fig. 6), and instead of being round they are half round; then again instead of measuring 15 to 20 millimeters in length they only measure 2 to 3 millimeters. It is very apparent that in this way it has been rendered much less cumbersome. The removable lingual arch is made of one piece and at its extremities there are locks, while the portion of the appliance located between the locks is contoured to follow the irregularities of the teeth. The locks are formed by soldering a half-round wire near the end of the arch, which wire will fit exactly into the vertical tube of the band (Fig. 7). The part of the arch directly back of the vertical wire follows the contour of the tube and grasps it in a manner similar to holding an object between the thumb and forefinger. The

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free end of the arch, which terminates in a ball, properly speaking, constitutes the lock, and when placed gingival to the tube all vertical motion is prevented on the part of the half-round wire which thus becomes immovable. In front of the lock (Fig. 8) the arch makes a double curve which carries it from the occlusal plane to the gingival border which it follows from one lock to the other. In order to transmit the force to a decided point, you can add one or more auxiliary springs to the lingual arch. These are made of wire, of a smaller gauge than that of the lingual arch, and are soldered to it by one of their ends, the free extremity being applied to the tooth to be moved. The lingual arch, thus constructed, forms one of the most adjustable of all the appliances and can easily be made into other combinations.

In certain cases, however, Mershon's removable lingual arch cannot be

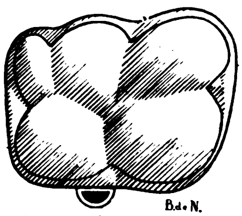

Fig. 4.

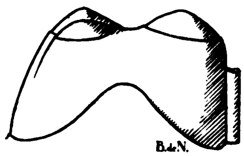

Fig. 5.

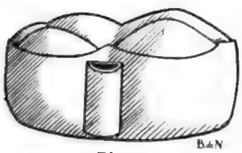

Fig. 6.

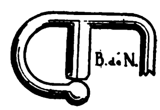

Fig. 7.

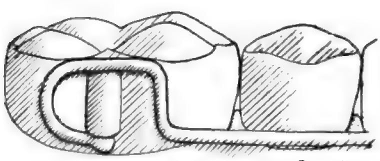

Fig. 8.

used; this occurs in cases where the bite is very close, where the mandibular incisors meet their opposing teeth very near the gums or where the mandibular teeth almost reach or do reach the palate. In these conditions, the lingual arch or the auxiliary spring interferes with complete occlusion and so ought to be rejected. Again we must look for a new type of arch for these conditions. After much looking and desiring to at least preserve the inherent advantages of the lingual arch, I have agreed upon a form of appliance that I call the "transpalatine arch." The construction of the transpalatine arch requires very little material, namely, a strip of 22 K. gold, gauge .25 mm. and 5 mm. in width for making the anchorage bands, .15 mm. is the gauge of gold used for the other bands; some half-round platinized gold wire and half-round tubes of the appropriate size so that the wire can slide into it with little friction, then some round wire of platinized gold about .9 mm. in

diameter for making the main arch. For the auxiliary springs, the wire can be slightly thinner measuring about .75 mm. in diameter. I use the wire called "Gold-Platinum retaining wire" which is manufactured by the S. S. White Company of Philadelphia.

Now for the characteristics of the appliance. Firstly, anchorage is obtained by placing bands without screws on the molars as in the preceding cases. In certain cases where the occlusion is particularly defective, it is impossible to make the vertical tube of proper height; thus we use two vertical tubes instead, one placed next to the other (Fig. 9, occlusal surface of anchorage band; Fig. 10, proximal surface of anchorage band; Fig. 11, lingual surface of anchorage band).

In all cases, at each end of the half-round tube, you hollow out a small part which will form a bed for the arch and give it a firmer seat while strengthening the lock at the same time. In front of the vertical tubes, the arch turns toward the palate at the mesial surface of the molar, for example,

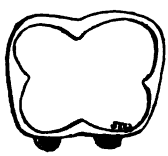

Fig. 9.

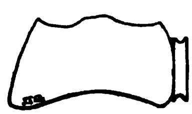

Fig. 10.

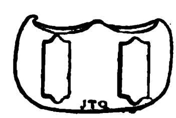

Fig. 11.

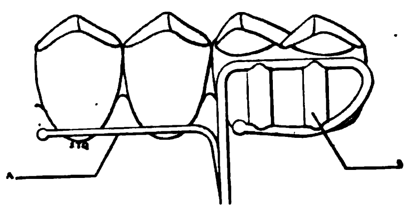

Fig. 12.

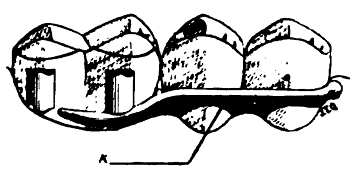

Fig. 13.

and then passing in a vertical plane, it exactly follows the irregularities of the palate as close to the mucous membrane as is possible. Thus, in proportion as the palate will change its form, the arch will follow the same changes. In order to act upon the teeth which do not serve as anchor teeth, we will use auxiliary springs which are strongly soldered to the arch. (Fig. 12, A—Auxiliary Spring; B—Lock of high type.)

In other cases it may be of greater advantage to use the arch without the auxiliary spring, then you can solder a "resting bar" to the anchor band, and this bar transmits the force to the teeth with which it comes into contact. (Fig. 13—A "resting bar" soldered to the anchor band. Due to an error in drawing, this bar does not rest at the necks of the teeth which is the correct position for it.)

I have not found another appliance which has given me so much satisfaction as this one has for the expansion of arches preparatory to all treatment. I lay stress on the fact that, originally I had not intended this appliance to completely treat orthodontic cases. Nevertheless, it is easy to modify it in the course of its use so that it can serve throughout the process and

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this can be done by hooking the free ends of the auxiliary springs across the palate after all the desired expansion has been obtained.

I have described the most recent appliances in the realm of orthodontia. In what way are the principles of levers applied to each of these appliances? As to Angle's appliance with its numerous bands you can admit the application of the power to be at a point outside the root. As a matter of fact Angle claims to obtain parallel movement of the teeth through their medium. Now coming to lingual arches, fixed as well as removable, the pressure upon the teeth is very slight, and if sometimes there is a slight tendency on the part of the tooth toward rotation about the apex, this tendency is corrected by the forces of occlusion which, acting continuously, correct and compensate it. Now, as to the transpalatine arch, it is obviously a lever of the third class since the appliance reaches to the very apex of the anchorage tooth.

Now, it remains for us to investigate how these appliances meet with the modern demand for invisibility, hygiene, and for the comfort of the patient. As far as invisibility is concerned perhaps it is best to quietly overlook the Angle appliances with their numerous bands. It is evident that an appliance of this sort will attract the eye very readily. On the contrary, the lingual arches, whether fixed or removable, and for a still greater reason, the transpalatine arches, are invisible to all, and very often my young patients have to submit to an examination by their little friends in order to convince them of the presence of the appliance.

Coming to hygiene, it stands to reason that an accumulation of appliances which interferes with the contact between lips, cheeks and the teeth, and which prevents proper use of the brush, must predispose to caries. Such is no longer the case when the entire appliance is hidden on the lingual surface, and the entire length of the gingival border is easily cleaned by the bristles of the brush. A still better condition is brought about when the appliance crosses the vault of the palate and so does not come in contact with the teeth at all.

Finally, considering the comfort of the patient, none of these appliances are annoying after the patient becomes accustomed to their presence for none of them should cause any pain; it is claimed, however, at all times, that the labial appliances are more annoying than the others because they are not so close to the teeth and therefore cause continual stretchings of the lips and cheeks. Now, for the action on soft parts, it is very important that you be able to do away with any injurious consequences to them.

I do not want to abuse your patience any longer so I will end my lecture with a summary. The appliances of actual repute for orthodontic treatments are based on the following facts: The majority of malpositions are due to a lack of development in the bony skeleton. Before all other things we must, thus, stimulate the bony growth by the continual application of a slight amount of force acting without interruption. To accomplish this, we must use appliances of small size and incapable of developing too much power. This force should be applied as near the apex of the tooth as possible. But although it be of small dimension, the appliance should still be strong and

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it must be simple without any complex construction; this condition is essential so that it may meet the requirements of hygiene and be comfortable to the patient at the same time. The appliances, furthermore, should be able to serve as a retainer without any need of adjustment which case is necessary when a patient becomes ill, leaves on a long journey or goes for a vacation.

All these considerations and even many more are found combined in the removable lingual arch such as Mershon describes and also in the transpalatine arch, a derivation of Mershon's arch, which I have described here.

THE WORK OF RETZIUS[1] CONSIDERED FROM OUR PRESENT KNOWLEDGE IN RESPECT TO MALRELATION OF THE DENTAL ARCHES

By B. W. Weinberger, D.D.S., New York City

If, as in a recent number of this Journal a contributor expressed, the basic knowledge of dentistry, and this includes orthodontia, is acquiring an understanding of the biologic principles which concern growth, development, etc., and the application of these principles to dental problems, then it is unfortunate that more do not try to determine the relative value of the evidence as presented in medical literature with an interpretation of same. Hasty conclusions should not be jumped at from isolated cases presented without first considering the average for a whole group of the evidence presented. At the same time it is unfortunate that there are some who do not go beyond the material mentioned by others without referring to the original source of information, thus thereby acquire first hand information. Were this rule to be followed, some surprising facts would be brought to our attention and our views thus modified.

It is necessary and essential for us to review the material placed at our disposal, from our position and place our own interpretation on same, endeavoring at the same time to clear up a lot of false statements that are thus misleading not only to ourselves but to the whole profession. On the other hand it might be "folly to be wise where ignorance is bliss." These same articles agree that the form of a structure can be so modified through inhibition of natural processes of growth and development during the embryonic and fetal period, as to cause abnormalities, and that these conditions are then retained through later life. If such is a fact, it is therefore advisable to study this stage more carefully.

As a few illustrations used in my previous articles have been criticized, unfortunately through an error found in "Keibel and Mall," I intend to review the whole of Retzius' work from the original, and endeavor to correct these facts which are misleading and thus hindering our working knowledge of one of the etiological factors in orthodontia.

In my first article,[2] I presented a "series showing a marked retrusion

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and protrusion of the mandible," Fig. 19, (Retzius). In the second[3] article, page 10, these same illustrations were repeated "showing a few of the variations found."

Johnson[4] and Hatfield[5] in using same illustrations states: "That the forward growth of the mandible is a natural process is evident in a study of the embryology of parts."

Keibel and Mall: "Fetus 42.5 mm. in length, and estimated at nine weeks old. In profile view the great development of the forehead region is striking, and below this the root of the nose is deeply depressed. The nose is still low, but the jaws and chin are well marked, the nose is very broad in proportion to its height, and the external nares are closed by the epidermal plugs which are continuous with an epidermal thickening of the upper lip."

Keibel and Mall: "Note especially the projecting upper lip and the receding chin, the double lip and the shape of the nose. The prima has almost a position it holds in the adult. In the first half of the third month the two lips project equally, but later the border of the upper lip and the

Fig. 1.

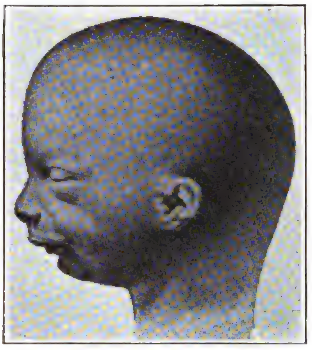

Fig. 2.

Fig. 1.—Enlarged drawing of Figs. 3 and 4 showing the results produced by pressure of the hands against the maxilla thereby causing an arrested growth of the same, while the mandible has continued to grow through lack of interference.

Fig. 2.—Enlarged drawing of a 117 mm. embryo, described in Fig. 10.

lip itself grow more rapidly, so that in the fourth and fifth months it projects markedly beyond the lower lip; by a stronger growth of the lower jaw and lip this difference is gradually overcome in the sixth to the ninth months, but by a kind of inhibition process the early fetal arrangement may be retained in the adult to a marked degree."

Hatfield[5] on the other hand has gone a step further and quotes as follows: "The accompanying illustrations from Keibel and Mall's *Human Embryology,* will show how a normal stage of growth may present an apparent malrelation of parts, whereas only when it persists or occurs at another period is it abnormal.

"Fig. 1, head of a fetus 42.5 mm. seen in profile Chapter VI. Development of Human Embryo, Fig. 71. "In the profile view the great development of the forehead region is striking and below this the root of the nose is deeply depressed.

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"Finally the profile view of the head of a fetus 117 mm. in length may be shown (Fig. 2) and in it I would draw especial attention to the projecting upper lip and the receding chin, to the double lip and to the shape of the nose.

"In the first half of the third month the two lips project about equally (as seen in Fig. 1) but later the border of the upper lip, and the lip itself grow more rapidly so that in the fourth and fifth months it projects markedly beyond the lower lip (Fig. 2); by a stronger growth of the lower jaw and lip this difference is gradually overcome in the sixth to the ninth months but by a kind of inhibition process the early fetal arrangement may be retained in the adult to a marked degree.

"Only ignorance of the developmental conditions normal for this period could mislead one to believe this to be an early stage of malocclusion. Later stages of growth in children between the ages of four and six or eight may show certain positions of the teeth, and width of the jaw, or structural relations disturbing when measured by a preconceived notion of the normal and regarded by some men with unwarranted apprehension."

Fig. 3. Fig. 4.

Fig. 5.

Figs. 3 and 4.—Front and side view of an embryo 42.5 mm. Reduced one-half. Unfortunately these reductions in size have caused a loss of detail and a true conception of these deformities.

Fig. 5.—Embryo 54 mm. long. This specimen clearly shows the normal relationship of the two dental processes, with the lips directly over each other. This condition is found at various ages and is taken as a "normal".

Unfortunately Hatfield has seen fit to criticize my previous statements and claims that only ignorance of the developmental conditions normal for this period could mislead one to believe this to be an early stage of malocclusion. Malocclusion in the first place, I understand, can only be associated with the two dental arches when the teeth have erupted and are present, but this I have carefully avoided stating at all times, that there is a malrelation of the dental arches and not malocclusion, due to various conditions found and already recorded. To arrive at some satisfactory conclusion, we certainly must determine then just what is normal. It is for that reason I desire to review the specimens as found in Retzius' work, for it was this treatise that was used originally in my first article in 1916.

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Figs. 1 and 2 are not photographs from the original specimens, but drawings enlarged to bring out more clearly the facial outlines. Fig. 1 is to be found in Table XVI, Figs. 8 and 9 (original Figs. 1-3, Table XV), while Fig. 2 is Fig. 10 of Table XVII, (original is Fig. 10 and 11, Table XV).

Figs. 1 and 2 are, however, those I used in my previous articles.

Figs. 3 and 4 are the original of Fig. 1 slightly enlarged, but the same size as shown in Retzius of a 42.5 mm. embryo, ten weeks old, and is the only

Fig. 6.

Fig. 7. Fig. 8.

Fig. 6.—Show embryos of 68 and 77 mm. about three months old. Reduced one-half. The lips and dental arches as in Fig. 5.

Figs. 7 and 8.—Embryos of 93 mm. Reduced one-half. Although of same age and length they show a marked difference in position and development of mandible.

Fig. 9.

Fig. 10.

Fig. 9.—Twins of 115 mm. Reduced one-half. These show clearly a difference might be found even in twins. See also Figs. 18 and 20.

Fig. 10.—Embryo of 117 mm. Enlarged drawing is shown in Fig. 11. Reduced three-fourths. Retzius calls attention to "the lower lip and chin having markedly receded."

one to be found showing the result of the inhibition of growth in the superior maxillary regions with the mandible either slightly protruded or the result of interference in growth of the maxilla. Why this has probably occurred, can be readily seen by the position of the hands, as Retzius states these to be in the natural position. That the position of the hands has an important

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bearing upon resulting conditions I have endeavored to show in my previous papers.

That there is a marked variation in facial development of the same corresponding age of development can be seen in the following illustrations and evidence cannot and should not be based upon isolated cases, but must be considered from the *average of cases* and *correlated with other findings.*

Fig. 11.—Embryo of 117 mm. presenting a similar condition to that shown in Fig. 10.

Fig. 12.—Another example of 117 mm. embryo.

Fig. 13.—Embryo 130 mm. Reduced one-half. In this case it is even more pronounced.

Fig. 14.—Embryo 131 mm. Reduced one-half. Compare the "normal" relationship of the dental arches with previous figure.

Fig. 5 is an embryo 54 mm. long, natural size, also an embryo of ten weeks.

This specimen shows the mandible, from my studies of hundred of embryos, to be in normal relationship to the maxilla, with the upper lip directly over the lower, quite a difference from the one shown in Figs. 3

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and 4. "The hands and feet are placed higher, fingers and toes are not spread so far apart as in the previous embryos."

Fig. 6 shows embryo of 68 and 77 mm. about three months old. Reduced one-half in size.

The lips and relationship of the jaws are the same as in Fig. 5.

Figs. 7 and 8, embryos of 93 mm. although of the same age, a difference in the position of the mandible is noticed.

Fig. 15.—Embryo of 152 mm. Reduced one-half.

Fig. 16.—Embryo of 155 mm. Reduced one-half.

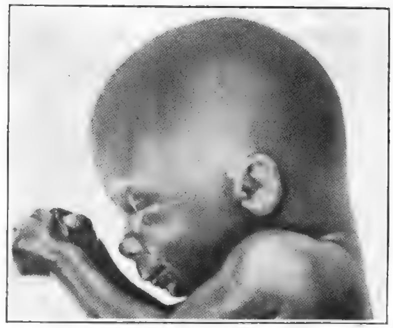

Fig. 17.—Embryo 151 mm., "normal". Reduced one-half.

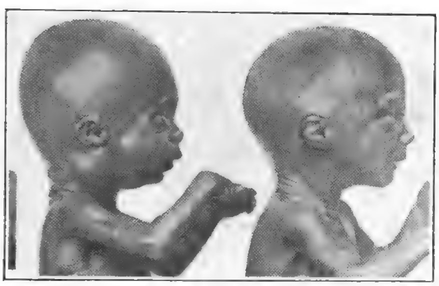

Fig. 18.—Twins 163 and 169 mm. showing another decided variation. Reduced one-half.

Fig. 19.—Embryo of 166 mm.

Fig. 9 shows twins of 115 mm. That there is a difference in developmental conditions normal for the same age, contrary to what others have supposed, is readily seen in this set of twins. The embryo in the left "has a larger, longer head and face, the nose and upper lip are larger and more prominent, the distance between the ear and the upper lip is, in the one on the left, strikingly greater." The mandible is also further posterior.

As both Johnson and Hatfield have utilized embryos of 117 mm. it will be advisable to dwell upon a number of specimens found in Retzius.

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Fig. 10 is the same as Fig. 2, reduced one-half natural size. The facial outline is markedly different and more extreme than that shown in either of the previous Fig. 9, although of the same relative age. Retzius states that in this specimen "the upper lip appears swollen, because the upper alveolar process towers above the lower; for the lower lip and chin have markedly receded."

Figs. 11 and 12 are two more examples of 117 mm. embryos, certainly there must be a "normal."

Fig. 13 is 130 mm. and is even more pronounced.

Fig. 14 is 131 mm. Here again is shown an entirely different profile although relatively the same age embryos as the previous illustration.

Again the difference appears in Figs. 15 and 16, 152 and 155 mm. respectively but less pronounced than in Fig. 14.

Fig. 20.—Twins 162 and 174 mm. Contrast with Figs. 17 and 18. Reduced one-half.

Fig. 21.

Fig. 22.

Fig. 21.—Embryo, 175 mm., "normal". Reduced one-half.

Fig. 22.—Embryo, 177 mm. This certainly does not show that there is a stronger growth of the lower jaw and lip and that this difference is gradually overcome later in embryonic development. Reduced one-half.

Fig. 17 is one of 151 mm. and we here find again what is undoubtedly the normal relationship of the two alveolar processes.

Fig. 18 represents another pair of twins 163 and 169 mm. "Both of these faces are distinctly different and it is hardly believable that they are sister and brother, much less twins."

When viewing these marked variations at any age I fully agree that only ignorance could mislead one to believe that there was no variation in developmental conditions at an early stage of development, but we must have a normal and which of the two represents the normal?

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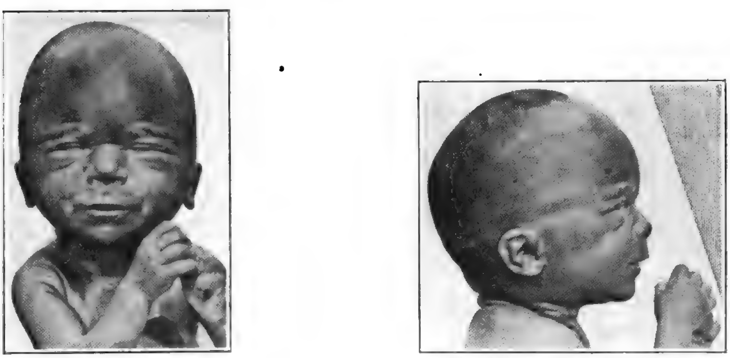
Fig. 19 is an embryo of 166 mm. There is no question of the marked malrelation of the two jaws. Note again the position of the hand.

Fig. 20 is another set of twins 162 and 174 mm. Here again we find a slight variation in facial contour, but not as great as in the previous sets of twins.

Fig. 21 represents an embryo of 175 mm.; contrast this with Fig. 22 of 177 mm. Here again we must determine between the normal and abnormal.

Fig. 23.—Embryo, 204 mm. At this age we still must contend with abnormalities. Reduced one-half.



A. B.

Fig. 24.—Embryo, 206 mm. Contrast with the previous illustrations.

Figs. 23 and 24 are the oldest embryos shown by Retzius, 204 and 206 mm. and we still must contend with variations.

These are but a few of the examples to be found in the biologic studies of Retzius, but I am convinced will show that we do find variations at all ages in the embryo and that the facial region is subject to the same maldevelopments, as have been found in other parts of the anatomy.

I cannot agree with either Johnson or Hatfield "that the forward growth of the mandible is a natural process as evident in a study of the

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embryology of parts," for if the mandible is retarded in its normal development during embryonic growth, it seldom will regain the amount of this maldevelopment, nor will this difference be gradually overcome in the sixth to the ninth month, through a stronger growth of the lower jaw.

A close study does not bear out Keibel or Mall's assertion of isolated cases that "in the first half of the third month the two lips project about equally, but later the border of the upper lip, and the lip itself, grows more rapidly so that in the fourth and fifth months it projects markedly beyond the lower lip, by a stronger growth of the lower jaw and lip this difference is gradually overcome in the sixth to the ninth months," for we find variations between the normal and abnormal at all stages of development. I do believe, however, with them, that by a kind of inhibition process the early malarrangement may be and is retained in the adult to a marked degree. The above study convinces me that my previous correlations with dried skulls were correct and that we do have a normal for all stages of development and that this normal is the same as in adult life. We must not permit ourselves to be misled by isolated cases and I trust this will also show we must investigate these studies more carefully ourselves and not rely upon others to do so for us. Their interests are not the same as ours, and unless we call their attention to what we are interested in, we cannot blame them for misleading us.

Further proof that the facial as well as other parts of the anatomy is liable to abnormalities prior to birth is shown in the two articles previously referred to, as well as in a more recent article,[6] and that the relationship of the jaws in a normal skull at birth and at all stages of embryonic development is I am sure the same as in adult life.

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE PRACTICAL APPLICATION OF OUR THEORIES IN SURGICAL EXODONTIA

By James F. Hasbrouck, D.D.S., M.D., New York, N. Y.

THE *Journal of the National Dental Association* published an editorial in November, 1920, from which the following paragraphs are selected. "Enthusiasm for the new, the impressively scientific, and the elation in the consciousness of being up to the minute, explain in a large measure the prevailing frame of mind."

"We have seen successive waves of scientific procedure and enthusiasm die upon the shore of practical experience."

"Another fact obtrudes—we listen patiently to many papers and more discussions on multitudinous subjects over and over again. Chemistry, organic and physiological, is presented and a listening chemist distressed, leaves. Then it is bacteriology, or histology, or mayhap surgery and an attentive specialist in one of these becoming restive, departs. A question at a later time brings the illuminating reply that the essayist was overstating or misstating, or impossibly concluding in many of his assertions."

"Confidence then in definitions, diagnosis, formulae, procedures, weakens."

For a time previous to the great war, in fact ever since the theories of focal infection have been advanced, much attention has been centered upon the oral cavity. Both the medical and dental professions agree that the mouth and teeth and particularly the granulomata or radicular abscesses which develop about the apices of the roots of dead teeth, are a very probable breeding place for many of the bacilli which are responsible for general or organic disturbances, and which are carried by the blood stream from these sources to various points throughout the system. Many methods for

*Read before the Section of Oral Surgery of the First District Dental Society of New York, April 19, 1922. Published by request of Essayist in the *International Journal of Orthodontia, Oral Surgery and Radiography.*

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the treatment of these conditions have been suggested—and in most cases, or perhaps I should say in the worst cases, surgical treatment seemed to produce the best results. At this time the specialty of exodontia and oral surgery received a distinct impetus—more specialists entered the field. Since the perfection of our technic in local anesthesia and especially since the war the crop of oral surgeons and exodontists has increased a hundred fold. This is as it should be. No branch of science may advance without active competition with its necessary investigations and experiments. And our branch at the present time is advancing rapidly.

I come before you this evening to say a word of caution, to sound a note of warning anent the radicalism in operative procedure which has been and still is advanced by some of our most able oralists.

Because a man happens to be an enthusiast and because the doctrine that the dental structures are the foci for the localization and dissemination of the agents of systemic infection is accepted; are we therefore to be expected to accept their advocacy of radical procedures in toto? As a matter of fact in studying the writings of these enthusiasts, they appear to be mostly on the defensive and they are busy answering various theoretical objections to their technic.

Our every day technic is I believe fairly well standardized if we omit the arguments of the enthusiastic few. The most important factor is that of diagnosis, which should be arrived at with painstaking care. There should be as accurate a history of the case as possible, which can be done through the cooperation of the physician in charge if necessary. Then the clinical examination should be made in the course of which not only the dental structures, but the tonsils, throat and nasal passages should be examined very closely. Then the radiographic examination should be made and comparison made with the clinical picture. The making of a judicial dental diagnosis is not always a simple procedure, and very often the skill and ingenuity of the consultant is taxed to the utmost in working out the chain of evidence upon which he must base his opinion.

The typical case of course is the usual history of the result of a general toxemia from some unknown foci. Everything excepting the contents of the oral cavity presumably having been eliminated. The patient comes to one of us for consultation and possible treatment. The mouth may be in a sanitary condition, or not and if not, it must be made so. Ill fitting crowns and bridges should be removed. The teeth should be cleaned and the gingival margins made healthy. After this is done we are ready to consider the amount of surgical interference which may be necessary. The teeth which should be removed are first all those which will not yield to reasonable treatment. Those which in spite of our most painstaking efforts still show a discharge of pus at the gingival margin, or any other symptoms of an inflammatory process going on, either acute or chronic. Secondly, the dead or devitalized teeth should be considered. Those which show areas of rarefaction about the apices of the roots should be studied most carefully. I know that our extremists say that all dead or devitalized teeth should be

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removed. I cannot accept this theory as yet. Our percentage of proved cures is still too small to make such a sweeping statement.

Don M. Graham says:

"There is the greatest confusion and disagreement regarding the status of the devitalized tooth. It is pretty generally conceded that teeth should never be designedly and purposely devitalized as a mere matter of convenience and mechanics for dental restorations. One class of physicians and dentists claim that no devitalized teeth should ever be harbored in the mouth. Still another class maintains that with careful sterilization and obturation of the canal, little, if any systemic trouble can possibly arise, since the focus, if there be one, is securely walled off by nature. Yet another body of serious and conscientious practitioners takes a middle course and maintains that with the healthy individual it is permissible and highly advisable to undertake aseptic and careful root canal filling without any fear of serious consequences. With another class of patients who are below par and show physical deterioration, they as strongly contend that no compromise should be made with the devitalized tooth.

"If a patient shows a tendency to rheumatism, or a tendency to easily catching 'cold' under no circumstances should such a person be compelled to carry the additional load of a possible dental infection. No patient belonging to the 'rheumatic group' can successfully harbor a devitalized tooth for at some inopportune time this damaged apical area is very liable to become hematogenically infected and a crippled condition is not infrequently the result."

The general conclusion seems to be that all other foci having been located or eliminated, the removal of the infected teeth should be undertaken.

The question is which and how? It is my opinion that in many cases, unfortunately it may become necessary to remove all. Let me remind you that I am now discussing cases which have come for treatment because they are sick—we know there is something wrong. Beginning with the removal of those teeth which on radiographic examination show definite areas of radiolucency about the apices of the roots. I am not wedded to any particular or spectacular technic for the removal of these teeth, excepting that I believe the simplest way to be the best. Every one must concede that the best instrument for extracting teeth is the forceps. An exodontist should be perfect in his knowledge of the manipulation of the various forceps. Other instruments may be an aid, certain operators have their pet methods, but for surgical exodontia the forceps is my instrument of choice whenever it can be used. When currettement is necessary, and it is not necessary in every case by any means, it can be done following the extraction with the greatest ease. The soft tissue can be dissected free and as much of the outer wall of the tooth socket removed as the most ardent enthusiast could desire. From a mechanical standpoint the cutting away of the alveolar wall should logically follow rather than precede the removal of the tooth. For the cutting away of the outer plate of bone we may use a bone burr, chisel or rongeur forceps.

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I cannot agree as yet with those who advocate the chopping out of each and every tooth to be removed together with a considerable amount of presumably infected bone adjacent thereto. How does the radical operator know where to stop? I would not. I will venture to say that in 50 per cent of these radical operations, if the field of operation were cut into, say in from six months to a year following, a smear taken and a culture made, we would be able to isolate a moderate number of the same bacteria that were present at the time of the first operation. You may ask, How do I know this? I am unable to prove it yet, but that is my theory and I believe in time I shall be able to demonstrate it quite to your satisfaction. I do not make any protest against this technic on this account—excepting to point out that the most radical operation in my opinion is not perfect and that we can achieve the same result by using gentler methods. After the surgical work is completed a plan for restoration should be worked out giving to the patient as nearly as possible a normal occlusion and good masticating surface. These restorations should be of a sanitary and removable type.

There is nothing particularly new about this method of using the chisel on the outer plate of the process for the removal of teeth. It was described and illustrated by Prof. Williger of Berlin in 1911 in his work, "Oral Surgery," as a means of removing difficult teeth and roots and as such should be highly commended in many cases.

In very many cases the abscess sac or granuloma, or whatever you may choose to call it, comes out intact attached to the root. You will grant, I am sure, that in these cases no curettement is necessary. Curettements are necessary whenever there is any visible area of infection and not only should this be done, but it should be followed up by a thorough swabbing out with an antiseptic, such as tincture of iodine whenever the outer plate or any definite area of bone has been removed.

The extent to which the bone cutting should be carried is a question of judgment which rests entirely with the operator as applied to each particular case.

Many successful cases where palliative or reconstructive treatment has been attempted have been reported and in this connection, the operation of apicoectomy, the amputation of the diseased root end with the curettement of the adjacent area, is mentioned.

In my own experience I have found the prognosis so uncertain, the results so unsatisfactory, that I have concluded that it is much better practice to remove the tooth. The operation itself is very easily performed. A semilunar incision is made in the gum opposite the end of the root, the flap is dissected up, the end of the root is exposed, the area about the root end is cleaned out with burr, curet or chisel, as the case may be. The apex being exposed, it is cut off well below the diseased area—the root canal of course having been previously filled if possible to the apex. In a case of this sort no harm is done should the filling material be pushed through the apex. The pocket formed as a result of the operation having been well swabbed with an iodine solution, may be sutured, or may be packed and heal by granulation.

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After having performed a great many of these operations with more or less negative results, I have come to the conclusion that as a means of removing a source of infection it is not a success. I believe Novitsky is right when he says that we are not arriving anywhere when we cut off a portion of a dead, septic root and allow the rest of it to remain in the jaw to continue its insidious work. But on the other hand, where we see patients with normal resistive power, apparently in perfect health, should not this method be advised as a prophylactic measure in our consideration of dead teeth, rather than advise a complete removal? I can recommend for your consideration on this point reports by Rhein, Merritt and others.

We are all studying the problem of impacted teeth. Regarding their etiology, I think very little is known—at any rate we have arrived at no very definite conclusion. Sometimes the impacted teeth are visible in the mouth—at others the information is imparted by the radiogram. These cases present for several reasons, perhaps the most common is that for sanitary reasons or prophylaxis it is deemed wise to remove the teeth. Then again there may be definite symptoms of various kinds—headaches—pain referred to the eye or ear—in many cases quite severe and of a neuralgic character.

We are all familiar with the picture as presented by the history, radiographic examination and clinical examination.

I am gratified that I am able to say that in these cases I believe our operative technic is fairly standardized. The operation should be carefully planned and performed as expeditiously as possible—by this I do not mean hurry. The perfection of local anesthesia has been a boon to humanity, but in one sense it has been a curse in that almost any one, no matter how unskilled or inexperienced, may by this means attempt many operations for the performance of which he may be quite unfitted, and because it does not hurt the patient and there is an hour or so in which to work, may get away with it somehow. This is neither exodontia nor oral surgery. What we desire is a group of men who are able to accurately diagnose these cases, have a well defined idea as to the method to be followed, and then perform the operation in a clean cut and expeditious manner.

An outline of the technic as usually followed: After having made the diagnosis and settled upon the anesthetic, the field of operation is cleaned and swabbed with tincture of iodine. An incision is then made in the soft tissues, just over the impacted tooth; they are then stripped back with a periosteal elevator so that all of the overlying bone around the impacted tooth is exposed. Then with a suitable bone cutting instrument, either a chisel, a burr, a rongeur forceps (why specify the instrument, some do well with one, some with another, this is a matter of judgment entirely, and we have no right to make rules to which exceptions must be taken in each individual case), the impacted tooth having been well exposed, it can be picked out with the forceps or pushed out with an elevator or exolever.

Just a word here regarding our anesthetic for these operations. We seem to have developed two kinds or schools of exodontists and oral surgeons—those who use local anesthesia and those who operate under general anes-

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thesia. This in my opinion is wrong—it is creating a split in our ranks where no split should exist. A good operator can operate using any kind of anesthesia, or if the occasion should demand, without any at all. The question of anesthetic also is entirely one of judgment in every case. Perhaps the patient may have a preference and whenever this is the case I always humor my patient when it can properly be done. All of this talk about so and so being a conductive man, or an N_2O man, or an infiltration man, should be "scrapped" and never referred to again. We are all exodontists and oral surgeons, and good operators I trust—and I think that the choice of anesthetic to be used in each case can be safely left to our judgment, along with other details of the technic.

In closing I should like to say a word of protest regarding some of our professional brethren who are shouting from the housetops their advocacy of this or that technic in such a way that one might infer that everything else is wrong. Is it not true that two men of equal mental poise may have the same education, pass the same number of years in a profession and ultimately arrive at different opinions on some leading questions?

Let me quote a paragraph from the writing of one whose voice we have frequently heard—"Dead septic teeth should not be pulled. They should be dissected out according to the technic I have described. The dissection should be done under novocaine anesthesia." Another illustration from a medico-legal authority—"After extensive observations I do not hesitate to maintain that general anesthesia, with the few exceptions enumerated, is unnecessary in operations in the oral cavity, and that, as a medico-legal expert, I should be unable to protect an operator from indictment in case of fatal accident from general anesthesia." In this instance the "exceptions" enumerated nullify the entire paragraph; nevertheless, in my opinion, it is an unwise statement. Many other quotations might be given. From what source do these writers derive their omniscience?

Let us say what we think by all means; if we have anything novel to propose let us do so. But at least let us give the other fellows credit for doing a little thinking of their own. Probably in time other and better methods may yet be suggested and I am sure I shall try everything which appears at least once. But we should be more conservative in our statements. It is this habit of loose talking which makes so many serious misunderstandings. Let us preach what we practice by all means, but only what we practice—not a lot of theoretical bunk. Let us be honest with ourselves, our patients and with each other.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

DENTISTRY AS A BRANCH OF MEDICINE*

By R. Walter Mills, M.D., St. Louis, Mo.

IT IS my desire to discuss with you informally certain matters concerning the relation of medicine to dentistry under present conditions. The opportunity to do so comes through your kindness and is very much appreciated.

You know, of course, that dentistry evolved with medicine about a century ago as an art of humble origin, originating through the activities of the barber surgeons and medical men of the time. Modern dentistry, a later product, evolved largely through the work of Pierre Fouchard, a Frenchman. Like many subjects that developed with, and were at first largely founded through, the acquiring of mechanical skill, it rapidly tended to divorce itself from its source of origin. But in reality dentistry originated as and has always been a branch of medicine. Its present and future tendency, judging by the analogy of various other branches of surgery and medicine, will be to develop broader outlets, to become again and more intimately a part of medicine. Examples are numerous of similar evolutions and adjustments in medicine. Surgeons were once much troubled with the matter of scissors and strings and how to do the operation; now they concern themselves with what the trouble is, what to operate for, and what the result of the operation will be; also with larger physiological and diagnostic considerations. A similar condition obtains in the instance of general radiography. X-ray work was founded as a specialty based primarily on a technical art and a special medium of interpretation. Now roentgenology is gradually assuming a closer relationship to clinical medicine through which association only it can be utilized to best advantage. While there will always be a great place for the general x-ray work the greatest advances in the future will be made by those following special branches of x-ray work, closely connected as subspecialties with clinical medicine and the patient. In dentistry I cannot but feel that we all sense the same movement. In dentistry subspecialties have developed, orthodontia, prosthetics, radiodontia, and developments have fol-

*From a lecture before the St. Louis Dental Society and Raper-Simpson School of Radiodontia.

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lowed through contact with such subjects as general stomatology, metabolism and embryology as related to oral problems and other broad medical considerations.

Dentistry, developed as a mechanical art, has felt the contact of other influences and is gradually being brought back to medicine, a part of which it is. Dentistry is no more apart from medicine than ophthalmology or laryngology. The same principles obtain as to surgical procedure, asepsis, and prophylaxis; the same problems present, requiring close observation, mature judgment, rational therapeutics, and technical skill.

The elevation of American dentistry has been a remarkable thing. It is a privilege to address members of a profession that occupies such a commanding position. I remember when in Europe being surprised and taking pride in the sign "American Dentist" seen so frequently in European cities. The American dentist occupies a unique position. This position, the world's leader in a branch of medicine, has accrued in the past largely through mechanical accomplishments. To run ahead of my story, if the American profession is to maintain this position it must grasp the next opportunity, must espouse considerable subjects in large manner medical, consider them, digest and utilize them to a greater degree than previously. I refer to such subjects as physiology, bacteriology, metabolism, medical economics, general surgical principles, and especially the great doctrine of prophylaxis.

The setting that has determined and necessitated this new adjustment between dentistry and medicine has been brought about by a number of factors: General acceptation of the practical application of bacteriology. The better understanding of digestive diseases through more exact knowledge of alimentary physiology and the resulting appreciation of disturbances of motility as the essential factor in such; a position largely resulting from the wonderful illuminations of gastrointestinal roentgenology. In less measure better appreciation of the influence of abnormalities of secretion have aided. These advances in gastroenterology have resulted in an appreciation of the importance of the oral appendages—teeth, and consequently of the importance of their care and conservation.

The increasing value of dentistry through its accomplishments has been a considerable factor in bringing dentistry and medicine in closer relationship. This through the growing doctrine of dental conservation, skillful prosthetics, effective dental hygiene and especially prophylaxis.

And now comes another subject that more than any other has helped to develop the situation and makes possible this great opportunity for dentistry and medicine to effect a closer relationship, the doctrine of focal infection. If dentistry needed one superurge to incorporate with medicine it has been supplied by this subject. While dentistry was assuming constantly greater importance as we learned of the importance of teeth and mastication in such conditions as in gall bladder disease, duodenal ulcer, the anemias, achylia gastrica, functional dyspepsias associated with organic condition and the diarrheas, the subject of focal infection made dentistry of still greater importance. While we learned of these things and learned more and more to

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have respect for and demand the highest class of dentistry we did not before this have the life and death factor forced upon us so dramatically as we have had since the doctrine of focal infection originated and became a vital issue.

I might perhaps make the subject of focal infection a sort of text for my talk with you since it is the factor before all others that has determined the present situation. The subject of focal infection is not new. Benjamin Rush, the great physician, maintained one hundred years ago that certain diseases had their origin in oral septic states, and since his time there have been other men who regarded such conditions as a primary source of general ill health. The very evident causative association of tonsillitis and valvular heart disease has been known for years. It was not until the last decade, however, that Billings of Chicago and Rosenow of the Mayo Foundation forced the conclusion upon us with such logic founded on definite observations and laboratory work as to make it an almost certain probability that many diseases have their origin in a primary infection in some other part of the body from that affected by the evident disease. Rosenow practically proved this in several ways: first, and most appealingly to physicians and dentists, by relief from a certain disease by the elimination of a distant focus of infection; secondly, by the recovery of a common bacterium from the different sites of infection. Another method, less evident but to the trained scientific bacteriologist furnishing just as appealing evidence, is through certain tests of sensitization.

Most of us at first viewed this theory of focal infection askance until much impressed by some unusual case in which eradication of some primary infection resulted in a brilliant cure, yet were later disheartened because apparently similar conditions in another patient did not result in a cure. By such experiences the weakness and difficulties of the method are manifested, for the theory and its practice imply the elimination of all foci before one can conclude that the infectious lesion is not secondary. Here is a very delicate matter for consideration by the dentist and one that is difficult for him to appreciate, because like any subspecialty dentistry has a tendency—we have no better word—to narrow one's mind to broader views; it has a tendency to accentuate its practitioners along one line. You are not alone the victims of this fact. All other subdivisions of clinical medicine are subject to the same thing. The nose and throat man sees only through his specialty, the gastrointestinalist inadvertently considers everything more or less in the light of his chosen field and the cardiovascular man does likewise. We must have these subspecialties but it does tend to narrow one's mind to limit his field, and we must constantly fight against this.

The adequate treatment of a secondary infection demands the elimination of all possible primary foci of infection. The dentist sees but the teeth, his chief concern, but he should realize that the teeth present only one of multiple possibilities as to focal infectious sites. Teeth afford but one possibility of primary infection, be it through caries, pulpitis, alveolar abscess, or what not. But just pause to consider additional possibilities: The possibility of the infections from the nasal sinuses, from glandular infections, bronchial infections, abscesses of many sorts, the number of infections that may arise

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in the gastrointestinal tract as from ulcer, gall bladder disease, colitis, chronic appendicitis, diverticuli, the possibilities of infections in the genitourinary tract, seminal vesiculitis, prostatitis, urethritis, pyelitis, in women from infections of Bartholin's glands and salpingitis. Recall endocarditis, myocarditis, even infections about the finger nails, infected hemorrhoids, fistulae, and the like.

No one knows the exact percentage of cases in which oral septic states are responsible for secondary infectious disease. One man estimates it as 20 per cent. Dental infectious states are indeed a major possibility but they represent but one. I hope in no way to be misunderstood as decrying the idea of local oral infection as a source of secondary systemic infection, but the thing goes too far. We are constantly meeting with instances in which the dentist without knowledge of general medical conditions has urged extractions and the like on the presumption that a perhaps obvious dental infection is the cause of a systemic disease. Only a week or so ago an exodontist urged the extraction of a last not very obviously infected molar in an elderly gentleman who was a patient of mine with the assurance that its removal would cure his rheumatism; the previous extraction of the majority of his other teeth by the extractionist having failed to do so. The man had a bad chronic appendicitis and an infected gall bladder containing stones. A few days later he—the patient, not the dentist—was in an insane asylum. His pain, his rheumatism, was the premonitory expression of a severe central nervous system disease having nothing to do with gall bladder, appendix, or teeth.

The whole tendency at present is to accept the theory of focal infection. Evidence is constantly accumulating in favor of it and in the present light of the attitude of the medical profession I should certainly urge that you espouse it. I think that those who accept it will win by such acceptation and failure to do so will be a misfortune and result in a sort of division between the sheep and the goats.

What should be the attitude of the dental surgeons toward this question of focal infection and its relation to oral sepsis; toward the matter as a general medical problem and toward the question of the physician? It seems a great mistake for the dentist to infer that oral infection is necessarily the source of a distant infection as unfortunately is sometimes done. We have had some not altogether consoling experiences along this line. Recall the sheer problem of the medical diagnosis of general disease expressing itself through disability, pain and discomfort that may or may not be of infectious origin. Recall if you will some of those that are known to be secondary to a distant primary focus of infection aside from those other numerous conditions that may simulate them. Heart and circulatory conditions, endocarditis, arteriosclerosis, pericarditis, osteomyelitis, neuritis, herpes, appendicitis, cholecystitis, peptic ulcer, colitis, and the greatest incapacitator of all, chronic arthritis.

It seems that the only rational procedure is towards a closer relationship of the dentist and the medical man; the dentist viewing the medical man as

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a consultant and the medical man taking great pleasure in regarding the dentist in the same way. With reference to this matter may I recall again, first, the multiplicity of sources of possible focal infection and the great diagnostic general medical problem as to the possibility or probability of an illness being one that might have originated from a primary localized infectious focus. Second, the difficulty of determining such a focus to be the primary cause, which implies the eradication of all possible sources. Third, the judicial problem as to whether a given focal possibility, of which the oral field is but one, should be dealt with radically or conservatively—this in the light of general medical conditions. This latter is the crux of the whole situation. In one patient known indeed to have a certain not active secondary infection but with a severe digestive disturbance such as achylia, mildly questionable teeth might best be let alone. Artificial dentures still fall short of Nature's provision. In another suffering from a highly dangerous or incapacitating illness, every remotely possibly infected tooth should be removed without thought of conservation. Every conceivable variation of the problem presents influences by social and occupational considerations. Who would recommend radicalism as to the incisors of a famous singer without just cause? Who would suggest conservatism when a patient was becoming totally incapacitated and bed ridden by arthritis deformans? Who would recommend elaborate conservative dental surgery in a person stricken with a not obvious but fatal disease? Who should pass on these questions? Dentist or physician? I leave it to you that the answer is obvious.

The principle under consideration, whether the dentist should act as medical man in any capacity, we will review very broadly. Since not entirely subscribing to the doctrine that the doctor should keep out of the mouth entirely, we cannot hold that the dentist should keep out of the rest of the alimentary tract. I have not the slightest feeling about the dentist's attempting a medical examination; a certain amount of medical experience would be a good thing to keep him in touch with medicine. But you say the trouble with dentistry now is that it is split into a dozen subspecialties just as the medical profession is split in scores of different ways. You see the difficulty of a dentist's mastering all his own subjects; how can he add medicine to his repertoire? Any field of dentistry is amply sufficient to occupy the most brilliant man; the same is true in medicine; no man can cover all specialties; if he becomes familiar with one branch he has accomplished all he can do. To repeat: it does not seem the part of wisdom for the dentist to attack general medicine. His eye and good sense will serve him better than any sort of medical examination that he may be able to accomplish.

When a case comes up where a patient presents an obviously medical-dental problem it does seem to me it would be well to ask for medical consultation. The patient should be advised to consult his physician, and if he has none to get one. He should be further acquainted with the advisability of having his medical man consult with his dentist. There is nothing unethical in the dentist sending the patient to a medical man in whom he has confidence and who he knows will cooperate with him to the patient's advantage.

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Doctors more and more refer their patients to other physicians for help in special lines. Of course good sense is in order. If the patient, as is usually the case, is apparently a perfectly healthy individual and believes himself to be, the dentist should obviously act according as he always has, dealing radically rather than conservatively with actual and potential oral septic conditions.

There are certain other subjects I might speak of to you. The question of focal infection leads to the question of radiodontia, a subspecialty of dentistry; how to use it and who should use it. Medicine has gone through these problems, problems analogous to those that the dentist is meeting at present. General roentgenology does not attain to the ultimate development or full utilization of any of its possibilities. If this be true of general roentgenology it is even more indisputably true that medical men cannot effectively attack x-ray work. I feel that in dentistry you will discover a similar situation for yourselves. The better method is to have certain men of your hospital group of men who limit themselves to x-ray dental work do that work. It is not a mere matter of looking at pictures and reading them. Any division of roentgenology is an art having a medium and technic of its own. Of course there will have to be a certain amount done by dentists in smaller places and even among certain groups in larger places, but I cannot help feeling that you will discover it is not wisest or most effective in the long run. Do not underestimate the rapidity with which the public learns of these things. For the first year or two people are quite ignorant in such matters, but in a few years they will have learned that x-ray dental films are not the equivalent of accurate diagnoses and wise judgment; very shortly they will learn that it is the man who stands behind the gun who is the valuable and responsible person. It will not redound to the credit of any man to do other than highly skilled work in any line.

There are certain other things I might speak of with regard to x-ray work. I understand from various members of your profession that you are troubled with commercial x-ray men, that they do, as they always do, inferior and half-hearted work and do not seem to consider themselves obligated by the ethics of the profession. In a certain way you may be responsible for this. In looking over dental literature I noticed the matter of fees frequently discussed. In medicine we do this in perhaps a little less obvious way. I should be surprised if there were any great remuneration in x-raying teeth. It is time-consuming and nerve-racking work. Considering also cost of equipment, material and assistance, of necessity a man must charge a respectable fee for his work. But a dignified fee in a measure precludes the utilization of radiodontia by a great many people. Most people are poor. The solution reached by medical men is that we must espouse some method of quantity production—I am speaking quite frankly—and be contented with small individual remuneration and in turn gain advantage by larger volume. As a matter of fact this is the paying thing in the end as evidenced by almost every other activity in which it has been utilized, from Henry Ford's on down. You have not yet solved this problem in dentistry. We perhaps

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have found its solution in medicine through pay and free clinics and reduction of fees. In private the practice is to send a bill for a certain standard fee and if necessary have an understanding with the patient that his fee is individually and confidentially reduced from this standard on his inability to pay this standard. There are great difficulties in the way of this procedure in x-ray work, which requires considerable outlay for equipment and material and the utilization of persons of high skill and judgment in making x-ray negatives, necessarily expensive. The production of x-ray negatives of high class is difficult. A few years ago we heard of the reduction of the x-ray into a mechanical art in which any girl could by certain formulae produce pictures equal to those of the master; but that production has not materialized. The question of individual judgment based on anatomical conditions and penetrabilities is just as active as it is in the question of what sort of dental procedure is best in the instance of a certain person. Perhaps the best outlet in the future will be through endowed institutions, pay clinics and large groups, in which specially trained, skilled and well paid technicians could be developed to do the technical work, economy being effected through the saving of time to the accomplished radiodontist who would thus be enabled to pass on a far larger number of cases than if he did the mechanical work himself.

The question of prophylaxis in dentistry is a most pertinent one. To the physician, the dentist hardly seems to take advantage of his great opportunity to teach prophylaxis. We certainly come into contact with many persons who have no knowledge of the proper way to care for teeth and gums. I would not have the temerity to state before this body how many patients of how few seem to have been instructed by their dentists as to the proper means of dental prophylaxis, or how many consult their dentists at fixed intervals, though in this the patients may be largely to blame. I have sat down with hundreds of patients and shown them how to massage the gums with a tooth brush, people who had never heard of such a thing, yet whose mouths showed full familiarity with the dentist in other lines. Prophylaxis is the humanitarian thing to teach and is operative along the same lines as quantitative production. It will be remunerative in the end if one cannot look at it in any higher light. Since this is doubtless an old saw with you, let me at least make the statement that instruction in prophylaxis appeals to the physician, especially the internist, very much indeed.

I have made a few scattering remarks. The subject is great. I might elaborate in any direction. Dentistry is not a separate art but a part of medicine, and it will surely in the future return to medicine as an integral part. I cannot but feel that those who take this broad view of the subject and grasp the present opportunity will benefit greatly.

DISCUSSION

Dr. Clarence O. Simpson.—It is rather hard to discuss a paper with which one entirely agrees. I have been in touch with Dr. Mills for quite a time and am familiar with his views on this subject, and he has tried to express them very moderately. He has decided opinions upon many of these subjects, but in his modesty and desire not to be aggressive, he has merely touched upon them. There is no question but that any thinking member of the dental pro-

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fession who is abreast of the times agrees with the majority of the statements that he has made. Dentistry is a part of medicine and it is lamentable that we have not had the opportuni y to be in closer touch with general medicine. I believe if dentistry were given that opportunity it would be accepted, but whoever was originally responsible, the condition at the present time is such that the medical profession does not receive the greatest benefit from the dental branch, and dentistry has been compelled to work out many of its important problems alone while she might have done it in connection with specialists in other lines.

Doubtless all of you have had the experience of trying to solve some technical problem and finally having seen the light by casually meeting and discussing this subject with some one in some other specialty, perhaps some one entirely out of the profession; perhaps some one in an industrial or purely mechanical line has helped you to solve the problem which has puzzled you for a long time. In practising one subspecialty I have had the experience of getting great benefit in discussions of mutual problems with members of other specialties, because they are so closely related there is bound to be mutual advantage from association and cooperation. This is true in the relationship of general dentistry or specialties of it and the specialties of medicine.

Dr. Mills has correctly stated that the internist is the one man who is responsible and by whom recommendations as to procedure should be governed. The dentist sometimes has felt that the medical man was interfering with the specialty of dentistry. From contact with some of those men I do not believe they have ever had that feeling about it; they would much prefer that the dentist assume the responsibility for the oral cavity and care for it properly. The trouble arises because some members of the dental profession do not do this. The physician has been compelled for the welfare of the patient to investigate these matters of his own accord. The tendency of dentistry to broaden and to view dental practice as a part of medicine—to view the mouth as a part of the body—is rapidly changing that source of friction; there will be less of it in the future.

Dr. Mills is competent to speak on radiodontia because he was compelled to practice it for a number of years. He was a pioneer in St. Louis in recognizing the far-reaching effects of oral sepsis, and for the benefit of his patients he practised radiodontia in connection with other work for many years. He very easily suggests the economics of this practice should be solved. The economics of any profession should be solved, but no solution has been found. Whenever the work is lowered to a fee where the patient cannot be given the proper attention, it is a question whether the patient gains or loses by the economic solution. The x-ray laboratories, as we know, have turned this work over to technicians, to ignoramuses who had no investment in education, no previous training, who were satisfied with inferior results and a remuneration of five or ten dollars a day as an artisan. The service resulting from these examinations is inferior, and an inferior or incorrect diagnosis is probably worse than none at all. It is a debatable question whether the patient is best served by cheap service or none at all when diagnosis is involved. We are constantly called upon to make dentistry cheaper, but we ought to make dentistry better and more expensive, and there is no way to reconcile these two tendencies. It could be made better and could be made cheaper, so that the problem will probably remain unsolved. Those financially able to have diagnostic and reparative service will demand it and get it, and those unable cannot get it unless it is under government control because none of us who practice are financially independent. We are dependent on our practice for our livelihood and it cannot give us that livelihood unless we have fees that compensate us for the time employed. That is even more true in general practice than in a specialty because the general practitioner in trying to do many lines of practice has the time problem ever before him. It is impossible to accomplish everything in a working day; it is impossible to serve a large number of patients, and under the present fee scale I know of no dentist who becomes wealthy. They are underpaid rather than overpaid. I know Dr. Mills has no solution but I wish he would stop bringing up the problem.

The only solution is in the establishment of clinics by men who have the money; philanthropists will have to supply the money, the men serving it get a remuneration, and

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patients get the best service. It can be so governed that only those worthy can partake of it, it could not be done in private practice.

Dr. Torber.—Some of the gentlemen asked me to say something about this problem so I will ask you to excuse me for my language. People today mention prophylaxis, and that is what we ought to think about because prevention is better than cure. I think prophylaxis ought to begin, not with the child, but with the fetus. During fetal life, the fetus takes a great amount of calcium and other salts, but if we look at the mother's diet we find it is not very abundantly supplied with lime salts. According to Charmond in New York, the average American diet is very short on lime salts; he figures that the average man takes .68 grams of calcium per day. The child of course takes much more to build up its bones and teeth. If we go to the mother at the time when the teeth are formed, we will see that the calcium is not sufficient, for the fetus needs the lime and it could take it through the mother's diet.

I read an article the other day about this problem. The author estimated that the fetus had taken about 30 grams of calcium, and he had followed the mother from the seventeenth week to the end of pregnancy. This mother was fed a liter of milk a day containing 1.7 grams calcium and had not been able to retain more than 4 grams during this period. The average diet is about .68 grams of calcium a day, so it seems to me the average mother may be short of calcium.

When we look at the teeth during pregnancy we find that they become badly decayed. There must be some connection between these. The fetus needs the calcium and takes it from the mother's bones and teeth unless the mother is nourished properly. I do not think it is caused by the acidity of the mouth, but by a metabolic disturbance—and this may be the cause with the ordinary decay; it may be lack of calcium salts in the diet.

The hospital at Washington University has been doing some very interesting work along this line of metabolism in infants. They find that calcium is negative in undernourished children during the first month of life. During the period when the second teeth are found, when the calcium balance is negative, the teeth could not be formed properly. I think dentistry will have to change a little and think not only of this local cause of dental decay but more of metabolic process. There are two processes going on, one inward and one outward, and the inner one may be changing the organic structure of the tooth; that is the way that the inorganic salts have very much to do with the whole metabolism. A disturbance in calcium metabolism will cause a disturbance in the whole metabolism, and it may be that a very great lack of calcium will produce an organic change in the matrix of the tooth.

Of course it is very important to clean the teeth, to keep the mouth clean, but that is not the only problem; we have to look at the diet, and in coming to this problem we cannot do it alone; we have to work together with the physician. I think that by working together with the physician we may be able to do something. We cannot do it alone and the physician alone could not prevent caries; he has to work with the dental profession. It is a great question whether the dentist should be a medical man too. I do not know what to say about that, but I do think the dental profession has to learn more about medicine, especially physiology and biological chemistry, because it is along that line we may be able to solve many of these problems.

Dr. Elmer Olds.—I appreciate what part of Dr. Mill's paper I heard very much. It seems to me that the two most important considerations have been left out of the discussion entirely. They have talked about nutrition, which is one of the most important subjects in the prevention of dental caries and disease of any kind, but the two most important have not been mentioned. I did not hear all of Dr. Mill's paper; perhaps he did mention it.

The first is sunshine, the second is exercise—there is a third, rest or recreation; three very essential qualities. Leaving those three out, you might as well leave out the fourth which is nutrition. Nourishment of course has to come both from within and from without. If you have one without the other, neither will do the most good. I have been working along preventive lines in dentistry for about ten years. The longer I work along those

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lines, the more I find I do not know about some things, and more about others. I find that plenty of sunshine, fresh air, proper rest and nourishment are the very essentials in the prevention of disease.

Dr. Otto J. Fruth.—It is rather refreshing to hear a medical man say that dentistry is a part of medicine. It is only a few years ago that it was considered a joke when we considered dentistry a part of medicine but now, say within the last ten years, the medical profession has looked upon us as the skirt behind which to hide perhaps. I think it was at the last joint meeting of the medical society and dental society that one of the members told us all the terrible mistakes dentistry had made and the number of deaths which had been caused by poor dentistry. He had seen root canals filled to the apex and way beyond. The x-ray had shown all that. We admit that the x-ray has shown our mistakes and they have proved a monument to our ignorance, but the mistakes of the medical men are always buried.

Some years ago when the emetin craze took hold of the country, a joint meeting of the medical society and dental society was held, which was well attended by the medical profession, and after it had been shown that by injection of emetin, pyorrhea alveolaris could be cured, the medical profession began to treat pyorrhea, which they eventually gave up. The work that has been done in roentgenology has been a great aid to us, but for a while there was a craze for the ruthless extraction of teeth, due mostly to the medical profession. This was usually the case when medical men did dental radiography. I have had cases referred to me with films showing perhaps six or eight teeth with so-called granulomatous areas with the recommendation that they be extracted. Upon examination of the case I could find nothing wrong although the films were marked as having granuloma and all sorts of infection. The interpretation of x-rays has been a great deal of aid to us. We know that Dr. Simpson on his charts always asks what information is desired and in that way he gives it to us.

The matter of fees is always an amusing one if nothing else. No doubt all of you have had the experience of having a patient referred to you by a physician, who after treating for some months with no results states, "There must be something wrong with the teeth—go easy; he hasn't any money." I sometimes remind the medical men that if they would send the patient to us first we would have a chance to get some money before they get it all. We are willing to work in conjunction with the medical profession and the sooner we can do it and the more we can do it, the better for the profession and the patient.

Dr. William Conrad.—I wish to compliment this gentleman for the very mild and interesting style in which he has presented this subject this evening. It certainly has been against my rule for many long and weary months to stay at this dental society this late, but it was interesting. This wave of investigation that has been passing over the medical and dental world has been a means of great good in broadening the thoughts of both medical and dental men, and when the final settlement comes, I believe that the whole problem will be settled by preventive dentistry, commencing even before the infant is born and carried on until the full development of the dental tissues has taken place. Prevention, gentlemen, is the only solution of this whole subject.

Percy Howe read a paper before this society some months ago, and during the presentation of the subject, he showed slides upon the screen—most terrific conditions from feeding. Diet! diet! God help you in preventing children from being reared on diet. Examine the mouths of everyone here tonight and what would be the result. Calamity! and yet preventive dentistry is just as positive in its results as that the sun will rise tomorrow morning in the east—provided it is not cloudy.

A Voice.—It rises just the same, doctor.

Dr. Conrad.—But probably some of you fellows haven't polished the teeth for three or four months and you couldn't see them. That is the point that I wish to make this evening, that it is just as sure and just as positive in its results if you practice it and insist that the family and patients follow it. Dental caries is a dirt disease—only comes that

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way. After a tooth is devitalized you have a form of necrosis or gangrene of the roots; but I wish to impress upon you gentlemen—and it has been agitated by me for some time—they become too wise when tooth polish is unnecessary and all you have to do is to feed them. Don't omit the tooth polish.

Dr. B. E. Lischer.—I didn't come prepared to discuss this very big subject, but I agree with practically everything Dr. Mills has said. I think he delivered it in a very comprehensive and calm way without any prejudice and stated a great many facts. All of us who reflect carefully upon the problem that confronts us must come to this one conclusion, that dentistry has developed its technical aspects about as thoroughly as can be expected with the means at its command, and that its technical methods have been tried over and over again and have been found wanting.

The profession reminds me of the fellow who lived in a greenhouse and threw stones at the panes and later replaced them. We are patching up mouths, and I don't think we need be ashamed of the way we are doing it. We acquired it mostly by our own efforts in spite of the crime of 1839 when we were told we had no rights in the medical faculty. We have no feeling about that point. It is useless to have now.

To those of you who do not see the Dental Cosmos, I would like to say that in the May number there appeared an article by Dr. Michael Davis, Ph.D., of New York, who does purely research work. He was asked to make a survey of the dental needs of many communities of the United States, and he reports those findings in the May number. If you will drop Dr. Davis a line he will be pleased to give you the whole survey, and there you get the problem which stares us in the face, which Dr. Mills has merely hinted at tonight. It will take the entire dental profession to take care of the adults with the minimum amount of service, while our main service should be to the children, and for that we are unprepared. Dr. Davis is not a dentist or physician but a doctor of philosophy who has had years of practice in examining conditions along this line.

I think dentistry has arrived at the threshold of universalism and it cannot be served by subspecialties, but there must be a concerted action on the part of the people. A good deal of this service should be supported by the public, we ought to hold ourselves ready to cooperate when that time comes. At the present time there is a survey of dental education promulgated by the Carnegie Foundation for teachers. That will come out in print shortly and in view of that it would be unwise to say anything about education. It is a great problem, and easy for anyone to say what dentistry lacks, but how are we going to solve it? There is such a thing as educating a man highly in medical science. Is it wise to keep a man until he gets his M.D. before taking on dentistry? There is such a thing as keeping him too long to acquire that dexterity he needs in the dental profession, and too long before he can earn his own livelihood. Dental men cannt solve the problem and medical men cannot solve it, but all have to cooperate. I am not saying they are going to be solved this year or next year, but the process is going on and we ought to help.

Dr. Conrad scoffs a little at the idea of diet, yet there are races found to be immune to dental caries who have not known the toothbrush. It is our modern life; just what we cannot exactly say. Dr. Olds has suggested a remedy along physiological lines. But in addition we ought to know something more. The future practitioner of the specialty I have the pleasure of being in will have some knowledge of pediatrics, physical diagnosis, anthropology, and certainly of nutrition because mechanically it has almost played out.

Dr. Conrad.—There have been so many things to talk about tonight that I can't keep them quite together. About thirty years ago or more this question of dental-medical education was very active, and the Chicago Dental College was organized for the purpose of making medical dentists and they continued doing so for four or five years, and they found it didn't work, and the Chicago Dental College has continued a plain, ordinary dental college ever since. The question of medical and dental education and all other forms of education—high school, university, etc.—is the livest topic, outside of the teeth, that we have.

Dr. W. L. O'Neil.—I certainly enjoyed the paper by Dr. Mills. I hardly agreed with everything he said. There is one thing that Dr. Mills said: he criticises the dental profession

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for not teaching preventive measures. I believe that every live wire in the profession is doing that, and I find that the medical profession is not doing anything along that line. Just try it. Ask those patients how they have been taken care of. If our own teaching hasn't done much good, a great many haven't received any advice from the medical profession. They go to a hospital and lie there for weeks without any oral prophylaxis. When a patient of ours is sick and confined to a hospital, we are the last people ever thought of.

Dr. Tober talks along the right line. He expressed my ideas very well. I don't agree with what Dr. Conrad says. I preach oral prophylaxis, I guess as much as any man in the house, and I preach diet too, but it is not enough to preach diet alone so we preach them all. Emetin was mentioned. I took that up and used it for a while, but by no means dropped any of the other means I had. I don't believe it did any good.

Dr. Mills (closing).—I must first thank you for very charitable views and favorable criticism that I had not altogether anticipated that discussion has brought out. I am not of your cloth and do not altogether know your method so I had to feel my way. It seems that the discussion has been much more valuable than the address. If I may be allowed a little comeback on one or two points before my get-away, I shall indulge.

About Dr. O'Neil's criticism that medical men have been derelict as regards oral prophylaxis, I might hedge by suggesting that it has been so indicated that we keep out of the mouth that we have some hesitancy in doing anything else. To turn the other way, since dentistry is to become a part of medicine you must all take lessons of our common mistress, so if you are to be a part of medicine you must allow the teachings of medicine in general. It is true that medical men have been guilty of not discouraging oral sepsis but the deficiences of some dentists along this line are also apparent. I simply gave it as my personal experience that I had seen very few patients who had been instructed by their dentists in dental prophylaxis. The first thing patients ask when being instructed is, "Why didn't my dentist tell me?"

I am a little ashamed to say that it was a surprise to me to hear the question of prophylaxis and preventive medicine discussed so much by you. I guess we have been a little narrow in thinking of dentists as those who minister to the mechanical affairs of teeth. Of course the great questions are prophylaxis and preventive medicine, and these lead to the great ones of the relation of preventive medicine to anthropology and the still greater one of eugenics. It has been remarked that uncivilized people suffer the least from caries. This is true, but we cannot draw a parallel between them and the people living under civilized conditions. The savage gets massage for his gums from the coarse food he eats and his resistance is high owing to his more natural life. We who live under conditions of what we call civilization are all sick. Not one person among us but shows the marks of disease. We think of certain superficial evidences of decadence, the hair turns gray, we must wear glasses, and we discover a certain amount of pyorrhea. We imagine everything inside is all right, and are shocked when we learn that we have chronic appendicitis or gallstones. But the same retrogression occurs inside as well as outside. There is hardly a normal appendix; the gall bladder is usually a little inflamed; there is probably a little pyorrhea present in all of us. We are all focally infected. We tend toward the conservation of diseased structures through our whole propaganda of treatment and prophylaxis. What will be the result in a few more generations? Careful anthropologists tell us the whole human race is becoming decadent. The bones are becoming lighter, the little toe has largely lost its function, the third molar is progressively less developed, and at the rate the cranium is growing in a few generations it will be impossible for a child to be born without the aid of instruments. Is there any answer? We can only hope that the future will find the solution. It has been human history that every problem finds its solution as it arises. Perhaps in the years to come reason will so be developed as to furnish the solution through practical eugenics, control of mating through education, and in this way control the situation and perhaps ultimately produce the superman we think of. Of course this is all nebulous. Certainly we shall do well to follow along the lines of preventive medicine and trust our followers to solve their problems.

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Dr. Simpson has spoken of my work in radiodontia. In extenuation I might say that a number of years ago when I first realized its importance I could interest nobody in the work. I went to the x-ray men but it did not appeal to them. I couldn't command a complete set of dental films in St. Louis. I had an x-ray laboratory so the natural thing to do was to take it up myself. Later as Dr. Simpson and others developed it and because they had the ability to judge the films from a dental standpoint I was glad to give it up. Radiodontia is really a dental field.

Since we all love a bit of a fight, I want to speak of Dr. Simpson's attitude toward the question of fees. It has been the consensus of your meeting that the subject of prophylaxis and preventive medicine is a great one, and the trend of things is in that direction. I cannot ascribe to a doctrine, that does not, it seems to me, coincide with this movement, that leaves out the great majority of people because they cannot pay. It is true I did not offer an effective solution; I hoped you would have it in your pocket. I did mention the case of Henry Ford. I cautiously suggested that by quantitative production we might be able to get a start in the right direction. As far as this attempt has gone in medicine in supplying the needs of persons who are unable to pay full fees it has been a success. In certain large clinics as much as 60 per cent of the work is at least partial charity. They have a sliding scale and make no bones about it. Locally we have attempted to solve this problem at the Barnes Hospital by a pay clinic—with much criticism from certain practitioners and doubtless some injustice to them. Yet at the Barnes Hospital a poor man can have just as good a gastrointestinal examination as a millionaire; perhaps better, because one does not have to propitiate the poor man and can examine when and as he will. The idea, so far as we have worked it out, seems to be success. A fee is paid by everybody who can. A patient who can pay five dollars to cover the expense of a gastrointestinal x-ray examination does so. The same if a ward patient. A private patient pays a technical service fee of ten dollars just as an operating room fee is charged and in addition a fee for consultation to the medical man. The laboratory at that had an income of $30,000.00 last year paying for all expenses including salaries. It very strictly does not try to earn money. Though those of us who are connected with it do not now do the mechanical work ourselves, we formerly did. I took every plate in my department myself until the last year. Then we got girls of the best class we could command. They can be taught to do very fair x-ray technical work. While they cannot perhaps do the most artistic type of work it does seem to me that the plan furnishes the greatest good to the greatest number. A Ford is not a Peerless or Pierce Arrow, but I dare say many think it preferable to not going at all. I cannot but believe that it is better to supply the country with a technically slightly inferior quality of work and so give a vast number of people something highly useful to whom nothing would be available otherwise. If you take a man who is familiar with x-ray work he can look over a large amount of stuff if he can get away from the technical time-consuming drudgery. It seems to me this is the most effective way to combat the commercial laboratory. If Dr. Simpson has a competent technician, even though he could not produce quite as exquisite work as the doctor is known for, he could look over and pass on fifty cases a day, and greatly increase his usefulness and capacity for service.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Razzing the Jazzvertisers

Q. Why does the nice looking young lady in the advertisement bite the x-ray machine? And when you answer, would you mind leaving a little hide on?

A. Young ladies are impulsive, and some of these camouflaged x-ray machines are so attractive that the girls just cannot control their feelings. Furthermore, the girls are not the only ones who "bite" on the trick x-ray machines; a lot of dentists, looking for easy money and fancy fixtures, rise to the bait of "it will pay for itself and give you a large profit with your assistant doing the work."

The mushroom companies manufacturing or assembling toy, "fool-proof" dental x-ray cabinets have such contempt for the intelligence of dentists that they bid for business with freak designs. Some are patterned after nursery furniture, so games with amusing characters may be improvised to make "radiography a lark" as advertised; some are designed like customary pieces of furniture to conceal the purpose of the apparatus and bring a delightful surprise to the patient when the joke is so cleverly revealed; while others appropriately but unintentionally display a grim humor in resembling a contrivance for an execution.

For illustration, there is the phonograph model for the musically inclined, just as decorative and less expensive in operation than its prototype, since no records will be broken in using it.

The megaphone type with which the patient impersonates a cheer leader, the effect being made more striking by donning "rah! rah!" costume and having a wardrobe of all college colors so the patient may represent a favorite college. This game may be varied by having the patient announce through the megaphone that Mabel is batting for Raper, or ask whether there is a doctor in the room.

The telephone bracket design which combines with the deceptively familiar arrangement a sinister touch in presenting a bayonet or projectile pointer or a blunderbuss muzzle.

The dog-house style, before which the patient squats in supplication for a bone; but in contrast to the doleful nonproduction of Mother Hubbard, "bones" are "pulled" with great and high frequency.

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The various modifications of the gallows and guillotine types, with which the black cap for the patient and a fool's-cap for the operator is optional but lends character. A suspended noose around the patient's neck adds to the realism of the entertainment and reduces the objectionable vibration in the superstructure.

The bung-hole technic for which the patient looks, listens, or smells in a mahogany barrel, is claimed to be quite harmless, presumably because the contents does not exceed the legal ½ of 1 per cent "kick." To one unfamiliar with its peculiar operation, there seems a probability of embarrassment to a modest "stylish stout" lady in a tight skirt when posing for the lower incisors.

The electrocution chair, with the high voltage transformer under it, may be upholstered to match the other furniture, and made useful as a seat while adding to the effectiveness as a decoy. When used for games the fun is increased by strapping the hands and feet and conducting a little static to whoever is "it" and sits in the chair.

The piscatory model to which you referred is quite popular with sportsmen for indoor training during unfavorable seasons, as considerable skill is required to hook and land the catch with it. Owing to the prevalent use of "smokeless" or "eatin" tobacco among males and spearmint gum among females, it is advisable to wipe the hook and apply fresh bait before each cast. The bait should be selected with regard for the supposed taste of the species for which you are angling, lolly-pops, ice cream, "hooch," and garlic being a small efficient assortment. If the directions are followed this machine should prove quite diverting to the operator, and when patients enter into the playful spirit of the sport they may be assured of the appearance and sensation of the poor fish.

The handwriting on the wall and the imitation typewriting on the circular letters indicate that the lucrative enterprise of duping dentists with near x-ray machines is dying from overwork. The recent competitive stroke is offers of machines for a small cash payment of $50 and upward with the balance in monthly installments extending over two years, one philanthropic company stating it has such confidence in the satisfactory returns that it is willing to risk 90 per cent of the investment, to the 10 per cent risked by the dentist. An installment sale with probably 50 per cent profit, protected by a chattel mortgage and drawing interest on the deferred payments displays pathetic faith in the transaction. A few more comedy "props" will be produced, and the threatened "kodak" machine to hold in the hands may materialize so one may be had in every home to forecast when baby is "cutting" a new tooth, but the radiographic equipment of the future will be the conservative efficient apparatus supplied by responsible, experienced manufacturers.

In reply to your reference to the conservation of hide, the present status of radiodontia and dentistry in general shows the ill effects of letting Nature take her course instead of resorting to the knife. The epidermis has been allowed to proliferate at the expense of the heart until we have professional Pachyderma and industrial parasitic Crustacea impervious to ethical or social

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regulations, and heeding only the criminal code. Since rational therapy does not prescribe ointment for callus, and platitudes have never corrected abuses, your indulgence is craved in the subcutaneous treatment and amateur taxidermy of radiodontic riddling.

Radiculararities

Q. What is the explanation for resorption of the roots shown in the accompanying films? The first molar, although apparently vital, was extracted because of pain in this region, the neck and shoulder. Half of the bicuspid root is gone, and it appears that resorption is occurring on the distal root of the lower molar.

Fig 1.

Fig. 2.

Fig. 3.

A. There is nothing in the radiographic evidence or history to indicate that the roots of these teeth have been resorbed. Since the teeth apparently contain vital pulps and there is no indication of local pathology or trauma, the condition is probably the result of incomplete root formation instead of erosion. Such hypoclastic anomalies are occasionally observed, although this molar is an extreme example. The theory of arrested development is strengthened by the lamina dura being shown around all of the roots except the lingual root of the maxillary molar, and it might have been possible to demonstrate it there. Were this absent, the possibility of destruction by perverted osteoclastic function would be admissible, since it occurs in retained deciduous teeth where the successors are congenitally absent. Additional evidence is offered by the cementum covering the malformed root of the extracted tooth with reasonable uniformity.

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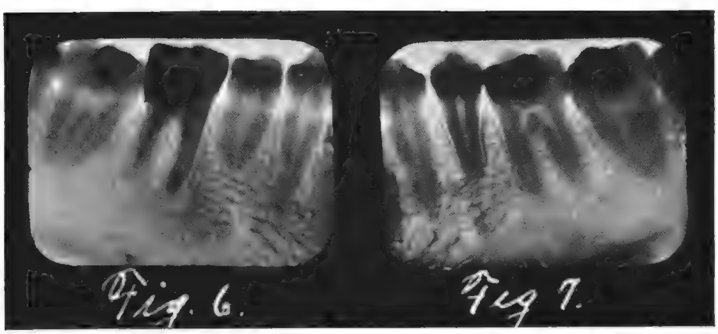
In attempting to account for imperfect root formation, altered metabolism during the period of development would be suggested. In this case the condition being presented in the maxillary first molar and the mandibular second molar would tend to exclude systemic disturbance, unless the personal history gives recurring periods of nutritional insufficiency corresponding to first and second molar dentition.

Figs. 4 and 5.—Examples of hypoclastic formation in maxillary premolars and molar. The pulps are vital in the premolars.

The practical significance of these examples of hypoclasia is in recognizing variations of normal development, and considering the possibility of imperfect root formation before assuming that all short or asymmetric roots are necrotic. This warning has been previously emphasized in this department, but as a vital diagnostic point will bear repetition. One of the headliners on the stereopticon circuit has repeatedly stated in his synopsis that



Figs. 6 and 7.—Incomplete root formation with vital pulps in adult patient.

he would draw a sharp line of demarcation between the pulpless teeth to be retained and those to be extracted. The "sharp line" is the condemnation of all "denuded" roots, but since the periodontal membrane may for years resist infection from adjacent bone involvement, the issue must be decided by the radiographic evidence of apical condition. As a diagnostic factor a "denuded" root, which can only be demonstrated postoperatively, is a confusing term intended to daze the audience.

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PATENTS

DENTAL APPLIANCE, PATENTED OCTOBER 12, 1920*

THIS invention relates to appliances for use in shaping band material about a tooth, or for measuring a tooth to ascertain the size of band required to embrace the tooth.

The invention has for one of its objects the provision of means for causing a strip of material to closely embrace a tooth.

Another object of the invention is to provide means whereby a strip of material may be expeditiously passed about a tooth and drawn tightly around the same to ascertain the size of tooth band required to embrace the tooth.

Another object of the invention is to provide an appliance having a pair of jaws adapted to grip the adjacent ends of a doubled strip of material and a member shiftable relatively to the jaws for contracting the loop formed by the doubled piece of material held by the jaws.

A further important object of the invention is to provide a dental appliance of the pliers type having a third handle pivotally connected therewith and shiftable in a plane transversely of the plane of movement of the handles of the pliers, said third handle carrying means adapted to contract the loop formed by a doubled strip of material held by the jaws of the pliers.

A further important object of the invention is to provide a reversible and removable band-material-manipulating attachment for dental pliers.

Another object of the invention is to provide a band-material holding and manipulating appliance so constructed that it may be readily adjusted to adapt it to shape band material about either upper or lower teeth at any position in the dental arch.

In the drawings:

Figure 1 is a side elevation of one form of appliance embodying the invention;

Fig. 2 a plan view thereof;

Fig. 3 an end elevation;

Fig. 4 transverse section on the line IV-IV of Fig. 1;

Fig 5 a perspective view of the band-material manipulating member;

Fig. 6 an enlarged detail view showing the plier jaws open and the ends of the band material in place between the jaws; and

Fig. 7 a view similar to Fig. 4 showing a slightly modified form of connection between the pliers and band-material manipulating member.

Referring to the drawings by numerals, *1* and *2* designate the pivoted lever members of the pliers. The members *1* and *2* are pivotally connected in crossed relation adjacent one end thereof by a pivot pin *3*, the longer arms of the lever

*Patent No. 1,355,790, United States Patent Office.

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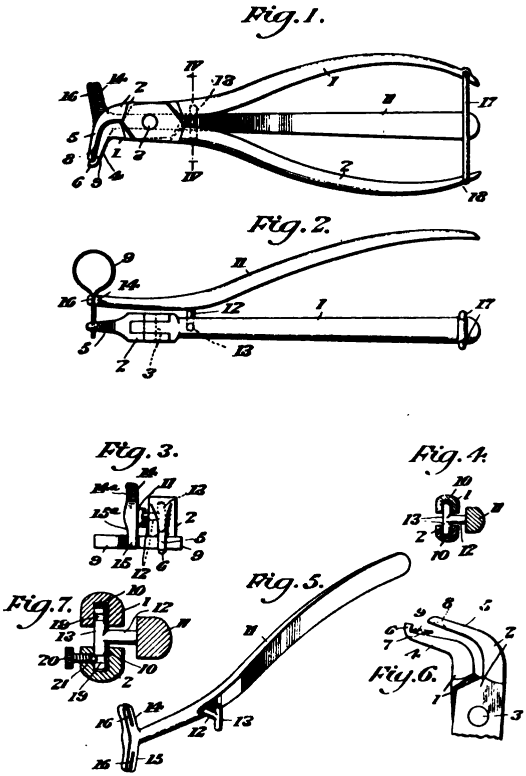
members being bowed to form handles and the shorter arms thereof being bent laterally at an angle to the pivotal axis of the members to form cooperating offset gripping jaws *4* and *5* closely adjacent the pivotal point of the lever members. The jaw *4*, is formed with a stop, lug or projection *6* at its outer end adapted to be engaged by the outer end of the jaw *5* when the jaws are shifted into gripping relation and is also provided with a gripping stud or projection *7* on the gripping face thereof a short distance from said stop lug. The jaw *5* is formed with a recess *8* in the gripping face thereof a short distance from its outer end, which is adapted to receive the stud *7* on jaw *4* when the jaws are shifted into gripping relation.



No. 1,355,790.

At the opposite side of the pivot pin *3* from the jaws the lever members are each formed with a socket *10* in the adjacent inner sides thereof.

A detachable and reversible tooth-band material manipulating member *11* is adapted to be pivotally held at either side of the pliers. The member *11* is provided with a laterally projecting lug *12* adjacent one end carrying a pivot pin *13* the opposite ends of which are adapted to seat in the sockets *10* on the members *1* and *2* to pivotally connect the member *11* with the pliers to swing about a pivot at a right angle to the pivot pin *3*. The longer arm of the member *11* is bowed to form a handle and the shorter arm thereof is provided with oppositely extending portions *14* and *15* forming a substantially T-shaped head. The head portions *14* and *15* are each provided with a transverse slot *16* ex-

tending inwardly from the outer end thereof. The slot in one head portion is in alignment with the gripping faces of the jaws of the pliers when the member *11* is supported at one side of the pliers, and the slot in the other head portion is in alignment with the gripping faces of the jaws when the member *11* is supported at the opposite side of the pliers. One side of each of the head portions *14* and *15* is shaped to conform with a tooth as shown at *14a* and *15a*.

A locking bail *17* is pivotally held to the handle of the member *1* and is adapted to be shifted to embrace the handle of the member *2* and engage in a notch *18* therein to hold the jaws of the pliers in gripped relation and to maintain the pivot pin *13* of member *11* in the socket *10*. The pivot pin *13* is sufficiently long and the sockets *10* are sufficiently deep to permit enough movement of the members *1* and *2* to cause jaws *4* and *5* to grip and release the band material *9* without disconnecting member *11* from the members *1* and *2*.

The operation of the appliance is as follows: The member *11* is arranged at the proper side of the pliers, according to the location of the tooth to be fitted with a band, and the handles of the pliers pressed toward each other until the ends of pivot pin *13* of member *11* engage in the sockets *10*. A strip of flexible metal *9* is doubled and engaged in the slot *16* of that head portion of member *11* which is in alignment with the gripping jaws of the pliers, and the ends of said strip *9* are inserted between the jaws of the pliers and the pliers operated to firmly grip the ends of the strip. The jaw *5* as it approaches jaw *4* will force the edges of the strip against stop *6* on jaw *4* and said jaws will tightly grip the registering end portions of the strip, the lug *7* indenting the strip of band material into recess *8*. The handles of the pliers are then locked by bail *17* and the appliance is inserted in the mouth and the looped portion of the band material *9* engaged around the desired tooth. The handle portion of member *11* is then pressed inwardly toward the pliers, thus rocking the head portion away from the gripping jaws to contract the looped portion of the band material until it tightly embraces the tooth. By providing several of the detachable members *11* and shaping the outer sides of the head portions *14* and *15* thereof to conform with the surfaces of different classes or types of teeth, the appliance is adapted to shape strips of band material accurately about different teeth. The appliance may be used to fit strips of gold or other band material directly about teeth, or may be used with a flexible strip of brass or other suitable material to measure teeth to ascertain the size of band required therefor. The appliance is adapted to draw the metal strip tightly about the tooth and will form permanent bends, creases, or indentations in the strip at the points where the outer face of the head portion of member *11* bears against the side of the tooth.

The jaws of the pliers and the head of member *11* are so shaped as to readily adapt the appliance for use either at the inner or outer side of either the upper or lower dental arch, and the plier members are so constructed that a slight movement of the handles of the pliers will cause the jaws thereof to grip or release a strip of band material.

In the modified construction illustrated in Figure 7, means is shown for positively but detachably securing the material manipulating member *11* to the pliers to prevent accidental separation thereof in handling the appliance. For

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this purpose the pivot pin *13* carried by member *11* is provided with circumferential grooves *19* adjacent the opposite ends thereof and a locking screw *20* is threaded through an aperture *21* in the member *2* of the pliers leading into the adjacent socket *10*. It will be obvious that the member *11* may thus be positively locked to the pliers, while positioned at either side thereof, by threading the screw *20* inwardly until the inner end thereof projects into the groove *19* in whichever end of pivot pin *13* is seated in socket *10* in member *2*. The groove *19* permits the member *11* to be rocked freely about its pivot when the screw *20* is in locking position. It will be obvious that various means may be provided for positively but detachably securing the member *11* to the pliers.

What I claim is:

1. A dental appliance comprising a pair of crossed handle members provided with gripping jaws at one end and pivotally connected together intermediate their ends, an auxiliary handle member having a slot adjacent one end adapted to receive a double strip of material held by the gripping jaws, and means for pivotally and detachably connecting the auxiliary handle member intermediate its ends with the crossed handle members to swing in a plane transversely of the plane of movement of the crossed members for varying the size of the loop formed by a double strip of material held by the gripping jaws.

2. A dental appliance comprising a pair of crossed pivotally connected lever members having cooperating gripping jaws at one end, a third member extending along one side of the crossed lever members, and means pivotally connecting the third lever member to one of the crossed lever members to swing about an axis extending transversely of the pivotal axis of the crossed members, one end of said third lever member being movable toward and from one side of the gripping jaws on the crossed members and having an opening therethrough adapted to receive a doubled strip of material gripped by said jaws.

3. The combination of a pair of pliers having jaws adapted to grip the ends of a doubled strip of material, a lever having a handle portion and a head portion provided with a slot extending therethrough in the direction of movement thereof adapted to receive a doubled strip of material held by the pliers, and means for pivotally connecting said lever intermediate its ends with the pliers to swing toward and from one edge of the jaws of the pliers for varying the size of the loop formed by the doubled strip of material held by the pliers.

4. A dental appliance comprising a pair of pliers having crossed pivotally connected members provided with laterally offset gripping jaws at one end, a tooth-band material contracting member having a handle portion and a laterally offset head portion with an opening through which a doubled strip of tooth-band material gripped by the jaws of the pliers is adapted to extend, and means pivotally connecting said material contracting member intermediate its ends with the pliers to permit movement of the head portion thereof toward and from one side of the jaws of the pliers.

5. A dental appliance comprising a pair of pliers provided with cooperating offset gripping jaws, a reversible member having two strip-embracing portions through either of which a doubled strip of material held by the jaws may pass, and means for shiftably and detachably supporting said member on the

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pliers with said strip-embracing portions at one side or the other of the jaws and one said embracing portions in position to receive a doubled strip of material gripped by the offset jaws of the pliers and contract the loop formed by said strip when the member is shifted in one direction.

6. A dental appliance comprising a pair of crossed pivotally connected handle members provided at one end with cooperating offset gripping jaws and formed with oppositely disposed sockets at the opposite side of their pivot point from the jaws, and a detachable and reversible auxiliary handle member provided intermediate its ends with a pivot pin adapted to engage in the socket in the crossed handle members, said auxiliary member being also provided with a head having oppositely extending portions parallel with the gripping jaws each of which is formed with a slot adapted to receive material gripped by the jaws in one position of the reversible auxiliary handle member.

7. A dental appliance comprising a pair of crossed pivotally connected handle members provided at one end with cooperating offset gripping jaws and formed with oppositely disposed sockets at the opposite side of their pivot, point from the jaws, and a detachable and reversible auxiliary handle member provided intermediate its ends with a laterally offset pivot pin adapted to engage in the sockets in the crossed handle members, said auxiliary member being also provided with a head having oppositely extending portions parallel with the gripping jaws, each of which is formed with a slot adapted to receive a double strip of material gripped by the jaws in one position of the reversible auxiliary handle member, said slotted portions of the auxiliary member having concave outer tooth-engaging faces and means for locking the crossed handle members together to hold the jaws thereon in gripping relation with each other.

8. A reversible tooth-band material manipulating attachment for dental pliers comprising a lever having means held thereto intermediate its ends for detachably and pivotally supporting the lever on the pliers to swing about an axis at a right angle to the pivot of the members of the pliers, said lever having a handle portion at one side of its fulcrum and a head portion at the opposite side of its fulcrum, the head portion having two transverse slots extending inwardly from opposite edges thereof.

9. A reversible tooth band material manipulating attachment for dental pliers comprising a lever having means held thereto intermediate its ends for detachably and pivotally supporting the lever on the pliers to swing about an avis at a right angle to the pivot of the members of the pliers, said lever having two opposite disposed laterally projecting portions at one side of its fulcrum each of which is provided with a transverse slot, one side of each of said projecting portions being shaped to conform with a tooth surface.

10. A dental appliance comprising a pair of crossed pivotally connected lever members provided at one end with cooperating offset gripping jaws and formed with oppositely disposed sockets at the opposite side of their pivotal point from the jaws, a detachable and reversible auxiliary lever member, a pivot pin held to said auxiliary lever member intermediate the ends of said member adapted to engage in the sockets in the other lever members and formed with circumferential grooves adjacent opposite ends thereof, a locking screw

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threaded into one of the crossed lever members the inner end of which is adapted to project into one of the grooves in the pivot pin in either position of the reversible lever member, and a pair of oppositely extending arms formed on the reversible lever member, each of which is provided with a slot adapted to receive material gripped by the jaws in one position of the reversible member.

11. A dental appliance comprising a pair of pivotally connected plier members having cooperating gripping jaws, a lever extending along one side of the plier members, a pivot pin held to said lever intermediate the ends of the lever and having a circumferential groove therein, one of said plier members being provided with a socket adapted to receive said pivot pin, and a locking screw threaded in the plier member provided with the socket and adapted to engage in the groove in the pivot pin, said lever having an opening therethrough at a point opposite the jaw of the plier member to which the lever is held.

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ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Foreign Bodies of Dental Origin in the Lungs and Esophagus. C. F. Bowen (Columbus). The Dental Summary, July, 1922, xlii, 7.

As a rule the dentist is not responsible when dentures, etc., are aspirated or swallowed, but in theory such an accident might occur in the dentist's office while the patient is in the chair; in which case he would neither have the skill nor the apparatus to remove it promptly. In addition to the immediate reaction there would be the more remote contingency of abscess of the lung, etc. The author, who is a laryngologist, has removed 368 foreign bodies from the air passages with loss of but two patients, respectively from edema of the lungs and pneumonia.

The following case is of special interest to dentists. While one of the latter profession was fitting a bridge into the mouth of a male patient aged 51, the article slipped into the throat. The subject choked a little but experienced no further trouble. It was naturally assumed that the object had entered the stomach, but the stools were watched in vain for its appearance. It was further taken for granted that it had escaped by the bowel undetected. At this juncture the patient thought he had taken a severe cold and his family physician heard some unusual sound during auscultation. The episode of the swallowed bridge led to a diagnostic x-ray and the object was seen lying in the right bronchus. The author then extracted it.

Bronchoscopic Cases of Dental Origin. H. H. Forbes (New York). New York Medical Journal and Medical Record, June 21, 1922, cxv, 12.

The title of the paper is slightly misleading, as the reader might be led to infer that the accidents unquestionably occurred in the chair, and that the dentist was entirely responsible. Of five cases reported but one (or at most two) occurred with absolute certainty while the patient was in the hands of the dentist. In this case the patient, a man of 82, coughed while a crown was being fitted, and the object was dislodged into the right bronchus. The dentist at once thought that it had been aspirated and the x-ray located it in the right bronchus, from which the author extracted it. In the second case the accident occurred at night in the home of the patient, a por-

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tion of a toothplate having been aspirated into a bronchus. In the third case a root of a tooth was coughed up by a patient who was under treatment for abscess of the lung. The aspiration may have taken place during some multiple extraction by a dentist, but as the patient had once before coughed up a piece of bone (which apparently was not preserved or even examined) the history must be regarded as too unsatisfactory for purposes of record. Apparently the x-ray noted further fragments, which in turn were expelled by coughing. In the fourth case some amalgam filling seems to have been aspirated during multiple extraction, and precisely the same accident occurred apparently in the fifth case. In the last two cases the extraction was made under general anesthesia, and as there were no symptoms before this event the inference is that the accident occurred in the dentist's office and during the extraction. In Case IV the dentist had no intimation that an accident might have occurred, but in Case V, in checking up after the extraction, the operator missed a filling. Hence it may be conceded that in Cases I and V the operator had some foreknowledge of the accident. In Case II the dentist is fully exculpated while Case III must remain doubtful.

Fads in Dentistry. F. R. Henshaw (Indianapolis). The Dental Summary, June, 1922, xlii, 6.

In an article entitled "Rationalism and Radicalism" the author briefly sums up the innovations of dentistry which have been abused to such an extent as partly to merit the term "fad." Of these the first was the epidemic of crown and bridge-work of the early 90's. To keep pace with the fad much sloppy and actually dishonest work was required which culminated in a reaction that almost threatened the existence of fixed bridge-work. In the end a compromise was reached. The many-toothed fixed bridge had to go, but the removable bridge will also have its day of trouble before a balance can be struck. Next to this fad came the porcelain craze because of its cosmetic appeal. The fallacy of porcelain lies in the fact that a relatively small number of dentists possess the technical skill required for satisfactory results, an objection which long held good for bridge-work as well. The third craze was root canal filling before crowning, and immediately following this and antagonistic to it came the dental radiogram and the propaganda of focal infection. The reaction to overconservatism in filling led to an epidemic of extraction and the introduction of surgical exodontia. We are now in the midst of this craze and its countercraze, for every abuse in dentistry calls forth its reactionaries and breeds disharmony in the profession. We are at present in a quandary, for while scores of obscure cases of disease have been cured by removal of oral foci of infection, thousands of useful teeth have been unnecessarily extracted without benefit to the patients.

Teeth in Relation to Diseases of the Eye. D. W. Wells (Boston). The Dental Surgeon, September 8, 1922, xix, No. 932.

The author first saw a case of infection of the eye from oral sepsis in 1901. An unsuccessful attempt at extracting a carious tooth in a 12-year-old

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boy had lighted up this infection. In this case the infection had first involved the antrum, soon setting up orbital cellulitis. There was an embolism of the central artery of the retina with permanent loss of vision on that side. Drainage of the orbital and antral cavities led to recovery. The antrum had apparently been the seat of a chronic infection. An analysis of 90 cases of iritis and iridocyclitis has shown that about one in five was due to infection from the teeth and tonsils. When injuries of the eye lead to severe infection it may be found that dental mischief of some sort preexisted.

In cataract operation and surgical intervention in the eye in general, there is a certain percentage of infection which would doubtless be reduced to a minimum if all focal lesions were remedied before operation. The lacrimal sac was formerly blamed for numerous postoperative infections now known to be due to infected teeth and tonsils.

The modern ophthalmic surgeon will seldom operate on the eye until the teeth have been radiographed and the tonsils removed. In one case of cataract extraction in which a preliminary iridectomy was followed by infection, the cataract was removed without accident after extraction of some infected teeth.

Some Chemical Problems as Applied to Dentistry. A. K. Epstein (Chicago, Ill.). The Dental Cosmos, June 22, 1922, lxiv, p. 637.

The author, who is a biochemist, limits his paper to two widely differing aspects of chemistry as applied to dentistry—the chemistry of commercial mouth preparations and the effects of diet on the teeth. Of the nine elements necessary to sustain life no less than seven are found in the saliva. Of interest is the normal reaction of the latter, which, while alkaline to test paper may be found acid to phenolphthalein. Something aside from mere indicators must be used to determine the reaction and hence of late years the hydrogen-ion concentration has been employed. A certain concentration is neutral and anything below this counts as alkaline while if the concentration is in excess of this point the saliva is said to be acid. The reagents usually employed as indicators themselves affect the acidity or alkalinity, while the substances admixed with the saliva, known as ''buffers,'' also interfere with obtaining the reaction. The hydrogen-ion concentration is sensitive to changes in the blood and exhaled air and at a certain point the calcium salts are precipitated and form the tartar. This may if not marked be removed mechanically. In higher degrees it may be shown that both alkalies and acids may aid in solution, each class dissolving some ingredient; it may also be shown that either class can injure the teeth, so that the problem of cleanliness is a very complicated one. The propaganda of tooth paste manufacturers is often far-fetched, if not actually inimical to the teeth.

In discussing vitamines the author calls attention to the recent discoveries of McCollum that one of these bodies, evidently distinct from the three known vitamines, is necessary for calcium metabolism.

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Teeth, Tonsils and Toxemias of the Intestinal Tract in Relation to Diseases of the Eye. G. H. Bell (New York). The Journal of Oralogy, June, 1922, i, 1.

The author has been writing on this subject since 1910 and believes that if the practitioner always keeps in mind the "Three T's" he will avoid much diagnostic confusion. The subject cannot be broken up any further, for when there is mischief in one of these localities the other two are apt to be compromised. Oral sepsis is the arch enemy of the ophthalmic surgeon, and before he operates he does, or certainly should, exclude the possibility of focal infection, which might negative the results of intervention on the eye. The trouble is apt to begin in childhood with an unbalanced diet in which there is excess of carbohydrate and especially of sugar. In adult life women continue this error of childhood. Next of course comes infective hygiene of the teeth. Infections of the teeth would not occur—and this is true of any focal infection—if there were not already present a toxemia of the acidosis type. The author mentions the comparatively new dogma that opposite types of food should not enter into the same meal. Protein foods should compose one meal and carbohydrates another, but they should not be combined in the same meal. Either proteins or carbohydrates may be combined with vegetables and fruits, for these contain but a small fraction either of protein or carbohydrate. The author might have added that rapidly digestive foods should not be combined with those of slow digestion. Practically nothing is said of the eye itself save that focal infection frequently causes keratitis, iritis, choroiditis and retinitis.

Mental Therapeutics and Modern Dentistry. J. W. Dorland (Pasadena). The Dental Cosmos, June 22, 1922, lxiv, p. 640.

This subject has been almost wholly ignored in dental literature with the exception of certain aspects, as hypnotism as a remedy for pain. That toothache subsides as a result of autosuggestion is of course one of the pioneer facts in the practice of dentistry. Apparently as a defense reaction inspired by fear of more pain the toothache subsides often as the patient reaches the dentist's office. The author cites the case of an Italian dentist of a bygone age who cured toothache by autosuggestion, causing the patient to crush a certain insect in his fingers after having told him that this act was a sure cure. This method was effective in about two-thirds of his cases. The personality of the dentist, rather than his prestige in the community, often determines the choice in the patient's mind. The fact that some practitioners seem less painful than others may be due at times to the patient and his imagination. It is evident that the dentist who can handle the neurotic subject and the child better than his neighbor does not owe his superiority necessarily to a lighter touch for some other factor must be present. The dentist who merely consults the sensations of his patient is certain to produce a defective result and it should be possible for the operator, by skilful diversion of the patient's attention and other simple devices, to diminish pain at critical moments.

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EDITORIALS

A Plea for More Intelligent Use of the Soldered Lingual Alignment Wire

IN a paper entitled "Methods of Orthodontic Treatment" by Dr. James T. Quintero, we find he reviews some of the leading types of appliances that have made their appearance during the last few years. One paragraph of the paper relative to the soldered lingual arch deserves careful consideration and comment. The following paragraph is taken from his paper:

"It is several years now since Lourie first used the lingual arch, not merely as a passive appliance to act as a retainer after the results have been obtained, for that was the purpose of the use for many years, but he makes it the active agent in the treatment. He also uses it in combination with a labial arch which passes quite high up on the gums and has vertical projections which pass downward and rest upon the crowns of the teeth. Then again at other times he uses the lingual arch alone. This process is excellent in all points but one and that is that the arch is soldered to the anchor bands.

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Thus, the appliance is absolutely stationary and all the adjusting has to be made in the mouth. Consequently the operator works blindly without knowing whether the way in which he used the pliers on it will produce the desired effect. But, as regards simplicity, upon comparing it with Angle's appliance, it shows so many advantages over it that it seems the operator ought not to hesitate a moment about using it and seeing that in this appliance, the very "ne plus ultra" of simplicity has been attained. Indeed, what can be simpler than having the anchor bands and the arch forming one piece which is strong and cannot be easily bent out of shape."

The thing that we particularly desire to call to the reader's attention is this statement: "The appliance is absolutely stationary and all the adjusting has to be made in the mouth. Consequently the operator works blindly without knowing whether the way in which he used the pliers on it, will produce the desired effect." We agree with the first part of his statement that the appliance is absolutely stationary and must be adjusted in the mouth, but the latter statement we would qualify by saying that *some* operators work blindly without knowing whether the way they adjust the soldered lingual alignment wire will produce the desired effect.

We believe that no style of regulating appliance that has been designed within recent years possesses advantages that can be obtained by the use of the soldered lingual alignment wire, as introduced by Dr. Lourie provided his technic is followed. The reason some men work blindly with that appliance is that they have never mastered wire bending or the principles of wire stretching as Dr. Lourie has always insisted upon their doing.

The soldered lingual alignment wire is a wonderful asset to the orthodontic treatment, but it also becomes a very dangerous apparatus if used by one who does not understand the principles upon which it is constructed or the various changes produced in making bends or stretching the wire.

Several years* ago an article appeared in the Journal dealing with wire bending technic which described some of the movements that could be produced with the soldered lingual alignment wire. That article was reviewed by Dr. Lourie before it was published and everything mentioned in the article was according to his methods of treatment at that time, and which plans had been and are still followed by the author.

Nevertheless in spite of that explicit description of the use of the soldered lingual alignment wire and changes which can be produced by bending the wire and pinching it, men have, as Dr. Quintero states, been working "blindly" without the knowledge of whether the way they use the pliers and soldered lingual alignment wire will produce the desired effect. We have known of cases where men have seen the results accomplished by the proper use of the soldered lingual alignment wire and have constructed and placed that appliance in the mouth of a patient without being familiar with the technic.

We have seen cases in which the appliance has been worn for months without any change being produced in the malposed teeth because the operator did not know how to produce the desired changes. In some instances

*International Journal of Orthodontia, July, 1918.

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such a man has abandoned the appliance as being useless, which probably is the safest thing for the patient in such instances. In other cases the appliance has been inserted and subjected to pinchings and bendings which have produced undesirable changes in the dental apparatus because the operator did not know what to expect when he made a certain pinch or bend.

Dr. Quintero's analysis of the appliance is very accurate. It is one of the simplest devices that has ever been employed and one which, because of this simplicity has allowed a great many men to get into trouble and produce unsatisfactory results. The appliance has so many advantages that we believe one who has not mastered the use of the soldered lingual alignment wire is allowing one of the most valuable forms of regulating appliance to be unused.

There are certain types of malocclusion which we believe can be more successfully treated by a soldered lingual alignment wire than any other style of appliance regardless of how complicated the other appliance may be. However, with all these advantages of inconspicuousness and simplicity we still insist that great care must be exercised in its use or actual harm will result.

Electro-Radiographic Diagnosis*

WITH the perfection of radiographic technic, it becomes necessary that the dental profession be able to make a diagnosis of the vitality of teeth with greater accuracy than was possible in former years. With a good radiogram, it is very easy to detect infection of teeth where it has progressed to a certain degree. However, in early pulp involvements where the question of vitality is of importance, the radiogram does not give the desired information. It is in these cases that the electric test for pulp vitality is of value. In fact, if the electric test is properly used, there is no other method that will give quite the same results.

While this plan of diagnosis has been employed by some men in the profession for a number of years, it remained for Dr. Howard R. Raper to prepare a monograph on the subject which gives information that had never before been collected in the pages of one book. Dr. Raper reviews the various styles of pulp testing machines, giving the advantages and disadvantages of each type in such a way as to show that he is speaking from a scientific viewpoint and not personal bias. He carefully describes the technic of making an electric test and calls special attention to the difficulties which may be encountered with various kinds of teeth. To any one who is interested in the vitality tests for teeth, we recommend this book as giving more information than he can find elsewhere. To those who have attempted the electric test and have found it unsatisfactory, we suggest that they carefully check up their technic according to the plan outlined by Dr. Raper, and it is very probable that they will locate their difficulties. The book is clearly and concisely written along the lines followed by Dr. Raper in his other writings. It contains 135 original illustrations.

*"Electro-radiographic Diagnosis," By Howard R. Raper, C. V. Mosby Co., St. Louis, Mo.

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British Society for the Study of Orthodontics

THE transactions of the British Society for the Study of Orthodontics for the year of 1921, as published for the Society by the Dental Manufacturing Company, is a very interesting volume. It is printed in clear type and a number of illustrations are made on special glazed paper in such a manner as to bring out the halftones very nicely.

The book contains six original communications and seven large contributions by members of the Society. Probably one of the most interesting articles is the communication by Sir Arthur Keith and George G. Campion entitled "A Contribution of the Mechanical Growth of the Human Face." This article is very well written, but some of the ideas expressed in regard to the mandible and the maxilla are not exactly in accord with some of the opinions held by other men. We especially believe that the illustrations, when viewed by themselves, are rather misleading, even if they do not exactly express the ideas of the authors.

Some of the papers read before the British Society for the Study of Orthodontics have been published in THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, and the other communications of the Society will be published in the early issues of the Journal.

The British Society is to be complimented upon the type of papers presented before it and the Dental Manufacturing Company deserves credit for the neat manner in which the transactions have been published.

A Letter From Dr. Case

To the Editor of THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND DENTAL RADIOGRAPHY:

IN THE *Dental Items of Interest* for September, 1922, under the head of Editorial Reviews, the writer (B. W. W.) in a supposedly fair review of my book, "Dental Orthopedia and Prosthetic Correction of Cleft Palate," makes the following statement: "Unfortunately at times he (the author) contradicts himself with diametrically opposite statements as though not quite sure of himself."

I have asked the Editor of the Items to require his reviewer to fully outline the places in my book that justified this statement.

If it is true, all students of my system of orthodontia should know exactly what it refers to so as to avoid falling into an error, and I shall be the first to acknowledge and do what I can to correct it.

If it is not true, let the author of it stand forth before the dental profession as a falsifier and slanderer without cause or justification.

Respectfully,

(Signed) Calvin C. Case.

Sept. 26, 1922.

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ORTHODONTIC NEWS AND NOTES

American Institute of Dental Teachers

The Thirtieth Annual Meeting of the American Institute of Dental Teachers will be held at Creighton University, Omaha, Nebraska, Hotel Fontenelle, headquarters, January 22, 23, 24 and 25, 1923.

A cordial invitation is extended to all persons interested in dental teaching. A. H. Hipple, President. Abram Hoffman, Secretary, 381 Linwood Ave., Buffalo, N. Y.

The Eighth Annual Meeting of the European Orthodontia Society Was Held in London, July 26 and 27, 1922

This was the first meeting of the European Society held since 1914. The Society was organized in 1907. The following scientific program was carried out:

10 o'clock: OPENING OF THE GENERAL MEETING.

Dr. G. Lind, of Amsterdam, Presidential address.

Dr. C. A. Hawley, of Washington, U. S. A.

The Principles and Art of Retention.

Dr. C. Johnson, of Helsingfors, Finland.

Some Cases of Traumatic Lesion of the Deciduous Denture and its Bearing on the Permanent Jaws and Teeth.

Dr. V. Andresen, of Copenhagen, Denmark.

Functional Treatment of Open Bite.

1 o'clock: LUNCHEON—Given by the London Local Committee.

2:30 o'clock: Dr. William C. Fisher, New York, U. S. A.

Some Variations in the Development of the Lingual Arch.

Dr. C. d'Alise, of Naples, Italy.

Syphilis, Tuberculose et Malocclusion.

Dr. G. Lind, of Amsterdam, Holland.

Remineralization of Teeth.

Dr. S. Dreyfus, of Lausanne, Switzerland.

De l'influence du mode d'allaitement chez les nourrissons sur le developpement du maxillaire superieur.

Dr. A. Kadner, of Hamburg, Germany.

Etiology of the Anomalies of the Teeth and a New and Simplified Method of Treatment of the Basis of the Knowledge of Etiology.

Thursday, July 27th, 1922.

9:30 o'clock: Dr. F. L. Stanton, of New York, U. S. A.

On the Application of Mathematics to Orthodontics.

Synopsis: An Orthographic mapping instrument; Orthographic maps of normal occlusion; Orthographic maps of malocclusion; The occlusograph an instrument for determining normal occlusion; Orthographic maps of occlusion as determined by the use of the occlusograph; A method of relating the map of occlusion to show the least tooth movement (theory of "least squares"). Dr. F. L. Stanton will be assisted by Dr. Juan Manes, of Madrid, Spain.

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Dr. C. Johanson, of Helsingfors, Finland.
Two Corrected Cases of Impacted Teeth.
Dr. A. L. Hipwell, of Paris, France.
Impacted Teeth Restored to Normal Occlusion, with Practical Cases Showing Results.

1:00 o'clock: LUNCHEON.

2:30 o'clock: CLINICS:

Dr. C. d'Alise, of Naples, Italy.
Revetement en caoutchouc de l'arc d'expansion.
Dr. S. Dreyfus, of Lausanne, Switzerland.
Le diagnostic en orthodontie le diagnoscope.
Dr. William C. Fisher, New York, U. S. A.
Lingual Appliances.
Dr. C. A. Hawley, Washington, U. S. A.
Manipulation of the Ribbon Arch.
Dr. E. Herbst, Bremen, Germany.
Some Novelties in Orthodontics.
Dr. J. T. Quintero, Lyon, France.
Sweating Bands for Orthodontia.
Dr. C. W. Roberts, London, England.
Porter Attachment for Lingual Arch.

5:00 o'clock: BUSINESS MEETING (For members only).

Admission of new members—Amendments to Constitution and By-Laws—Election of Officers and Censors.

New York Society of Orthodontists

A meeting of the New York Society of Orthodontists was held at the Hotel Vanderbilt on Wednesday, October 11th. The following program was carried out:

2:30 P. M. CLINICS:
Taking Plaster Impressions.
James C. Allen, New York, N. Y.
Making and Fitting Plain Bands Directly to Molar Teeth.
C. Sterling Conover, New York, N. Y.

4:00 P. M. Discussion of Clinics.

4:15 P. M. Case Reports:
"A Case of Premature Development on One Side of a Dental Arch." Herbert A. Pullen, Buffalo, N. Y.
"Half-Buccal Alignment Wire in Combination with Lingual Arch Wire, Showing Case Treated." William C. Fisher, New York, N. Y.
Reports on Three Cases of Varying Types. Harry Dean, New York, N. Y.

4:45 P. M. Discussion on Case Reports.

5:00 P. M. Paper.
"A New Method of Diagnosis for Orthodontic Cases." Alexander Sved, New York, N. Y.
Discussion: Opened by Gilbert D. Fish, C. E., New York, N. Y.

6:30 P. M. Dinner Served in Private Suite.

8:00 P. M. "A Review of Recent Papers by Sir Arthur Keith and Professor Bolk on the Mechanisms of Growth and Racial Differentiation." Professor William K. Gregory, Assistant Professor of Vertebrate Paleontology, Columbia University.

The next meeting of the New York Society of Orthodontists will be held on Wednesday afternoon and evening, December 13, at the Hotel Vanderbilt, New York City. All ethical members interested in the practice of the specialty of orthodontia are invited to attend.—William C. Fisher, Secretary.

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Proceedings of American Society of Orthodontists

Dr. Wm. Fisher desires copies of the Proceedings of the first, third, fifth, twelfth, and seventeenth annual meetings of the American Society of Orthodontists. If any member has a duplicate copy of any of these volumes, please communicate with Dr. William Fisher, 501 Fifth Ave., New York City.

Montana State Dental Board Examinations

The Montana State Dental Board will hold its semi-annual examinations the second Monday in January, 1923, at Helena, Montana.

Notes of Interest

Dr. D. F. Keel wishes to announce to the profession the opening of offices for the exclusive practice of orthodontia, Reaves Infirmary, Greensboro, North Carolina.

Dr. James M. Mullen announces the opening of an office at 6008-6009 Jenkins Arcade, Pittsburgh, Pa. Practice limited to orthodontia.

Dr. Fred A. Hager announces that his practice is limited to orthodontia and radiodontia, 503 Main Street, Johnstown, Pa.

Dr. Herbert A. Pullen announces the association of Dr. Clifford G. Glaser in the practice of orthodontia exclusively, 131 Allen Street, Buffalo, N. Y.

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The International Journal of
Orthodontia, Oral Surgery and Radiography
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VOL. VIII | ST. LOUIS, DECEMBER, 1922 | NO. 12

ORIGINAL ARTICLES

ARCH PREDETERMINATION AND A METHOD OF RELATING THE PREDETERMINED ARCH TO THE MALOCCLUSION, TO SHOW THE MINIMUM TOOTH MOVEMENT*

BY FREDERICK L. STANTON, D.D.S., NEW YORK

IN order to solve any problem we must first know the nature of the problem. The solution usually rests on the ability of the investigator to state his problem. We are met to discuss two very complex and baffling questions.

1. The predetermination of the normal form and dimensions of human dentures (by mensuration of plaster models of the irregularly placed teeth).

2. The placement of the map of occlusion over the map of malocclusion in such a way as to show a minimum of movement, to change from malocclusion to occlusion. A more precise statement would be that the sum of the squares of displacement shall be a minimum.

It would be superfluous to waste the time of this audience in describing the mutual mechanical relations of a normal human denture. In your postgraduate course you were taught that each cusp had its normal place to fit in the opposing arch; that each tooth bore a definite relation to the neighboring teeth, producing when normal, the picture so well known to you all, of normal occlusion.

If we wish to predetermine the form of a dental arch we must first know how *normal arches* vary in form and dimension.

The anthropologists tell us that normal arches may be found in a wide range of forms in normal skulls. They classify them as elliptic, ovoid, approaching circular, U-shaped, and diverging.

*Read before the twelfth annual meeting of the Alumni Society of the Dewey School of Orthodontia, Chicago, Ill., April 27-28, 1922.

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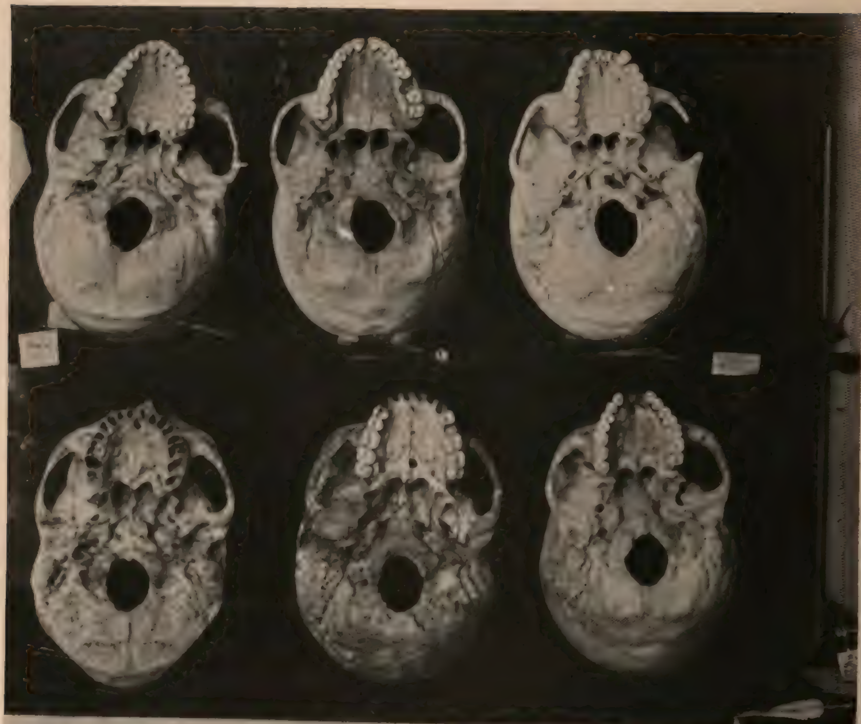

Figs. 1 and 2.—See Fig. 3.

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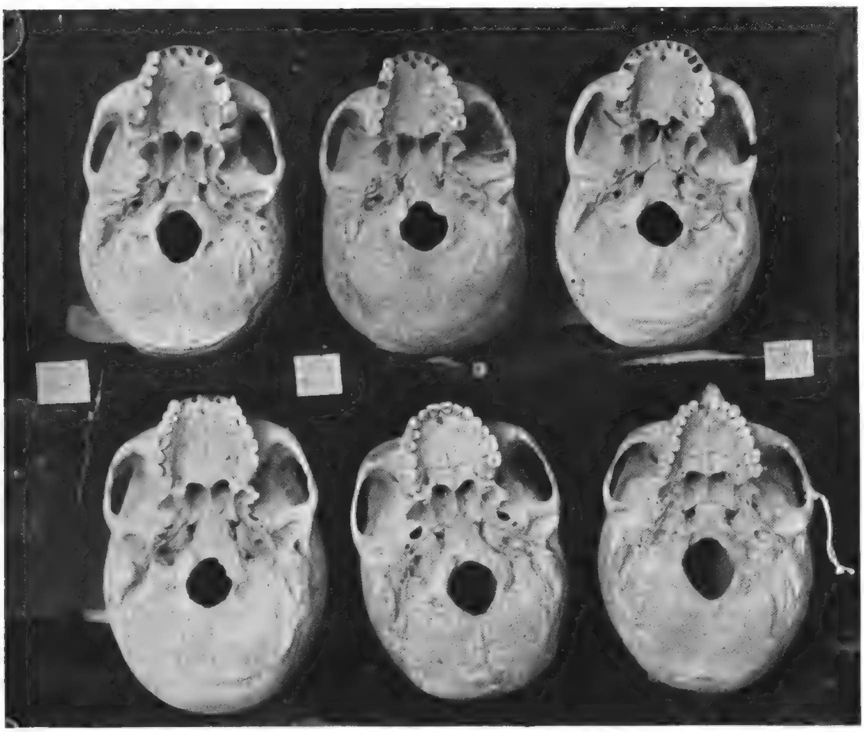
In regard to breadth they designate them within the limits of the normal as medium, narrow and broad, and according to length as medium, short and long. According to the ratio width divided by length, they speak of them as:

1. Dolicho uranic.
2. Meso uranic.
3. Brachy uranic.

Dolicho uranic when arch index is below 110; meso uranic when arch index is between 110-115; brachy uranic when arch index is above 115.

As Hrdlicka points out, there is a wide range of variation in the *relative*



Figs. 1, 2 and 3.—Skulls from the National Museum showing variations of arch form. Photographed by Dr. Mitsuru Okada of Tokyo.

dimensions of the normal arch (from 90 to 150). In some normal cases the greatest width is but $\frac{9}{10}$ of the length, while in other normal types the width is $\frac{15}{10}$ of the length. All variations of arch form may be found in one and the same race.

Hrdlicka further states that he does not find in any of the larger groups any *single type of arch* which alone could be considered *normal,* and that it would be radically wrong for dentistry to try to reduce all dental arches to any one form or one set of dimensions.

And while the dolichocephalic skulls usually contain dolichouranic arches, still normal skulls may be found with the opposite form of arch to skull type.

Hrdlicka concludes by stating that in every race and even under most

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normal conditions we find a variety of arches, and it will be the duty of dental surgeons to pay close attention to these facts before they can intelligently treat their patients.

It follows, therefore, that any plan of arch determination must be *flexible enough to produce arches varying in form* such as the ellipse, parabola, cubic parabola, "horse shoe," parallel sides, etc.

The plan must be flexible enough to produce arches varying in their relative length and breadth, within the range of variation exhibited by normal arches, i.e., $\frac{\text{length} \times 100}{\text{width}}$ shall vary between 90 and 150.

As orthodontists you are familiar with the appearance of normal dentures when viewed in the living or when reproduced in plaster casts. I have

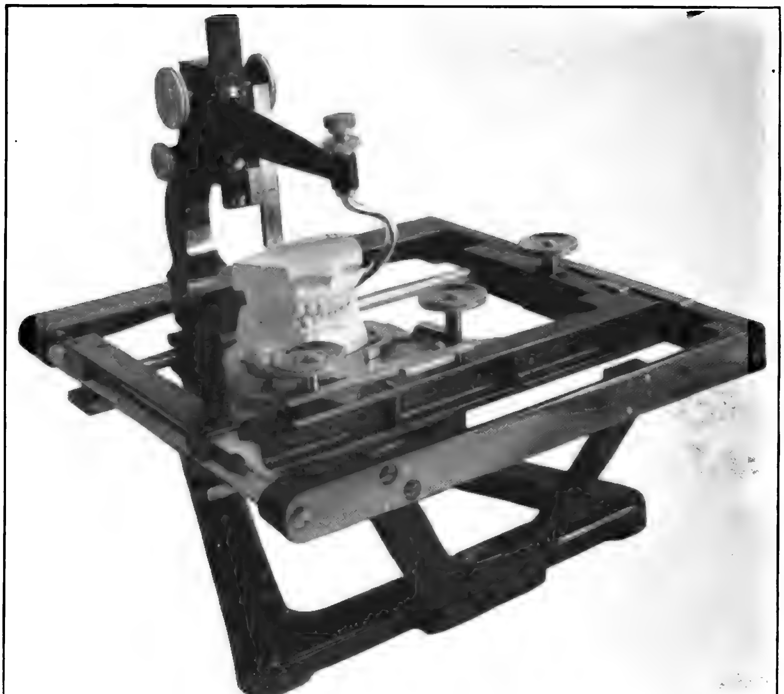

Fig. 4.—A new surveying apparatus designed by Gilbert Dudley Fish, C.E.

reviewed for you the viewpoint of the anthropologist by quoting from Hrdlicka's paper, "The Normal Dental Arch." I will now show normal occlusion, from the viewpoint of the engineer, as a problem of three dimensional space.

The following normal case was provided for study by your president, Dr. Eby. The usual orthodontic photographs of the model are first shown, together with photographs of the patient. (Figs. 5-13.)

Orthographic maps were made with a suitable surveying apparatus.

1. Horizontal map.
2. Right side elevation.
3. Left side elevation.

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4. Front elevation.
5. Profile.
6. Vertical cross section incisal region showing horizontal and vertical overbite.
7. Vertical cross section through first molar region at mesiobuccal cusp lower first molar.

In a previous paper[2] the three reference planes have been carefully de-

Fig. 5.—Eby Case, front view.

Fig. 6.—Eby Case, side view (right).

Fig. 7.—Eby Case, front view smiling.

Fig. 8.—Eby Case, front view showing occlusion.

fined. They are the XY, XZ, and YZ. For a proper understanding of arch determination the reader must thoroughly master the theory of these 3 planes as reference will be continually made to the planes by using their letters.

In Fig. 14 we have the upper (solid line) and lower (dotted line) teeth projected orthographically to the XY plane. (Plane of projection.)

This plane should be selected parallel to the occlusal plane as defined in a previous paper.[2]

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In Figs. 16, 17, and 18 (left, right and front elevations) is shown the trace of the XY plane which does not bisect the overbite. In other words, the plane of projection was slightly tilted from front to back. This tilting can also be observed in side elevations (Figs. 15 and 16). This error in leveling would have no appreciable effect on the horizontal map. The maps were

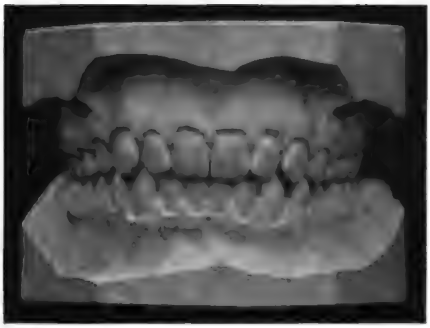

Fig. 9.—Eby Case, front view of model.

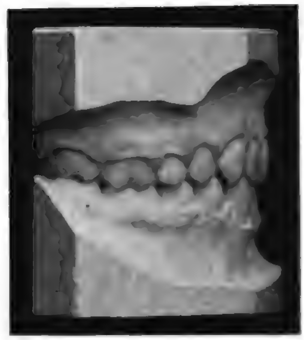

Fig. 10.—Eby Case, right side view of model.

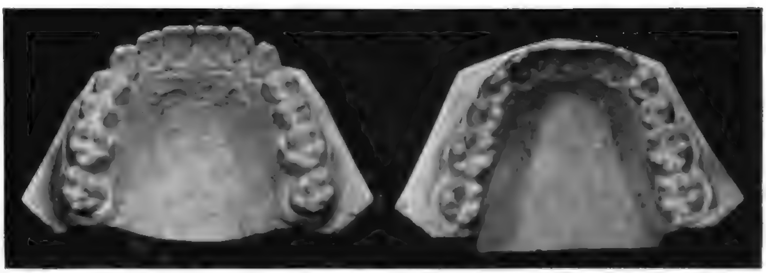

Fig. 12.—Eby Case, occlusal view of model.

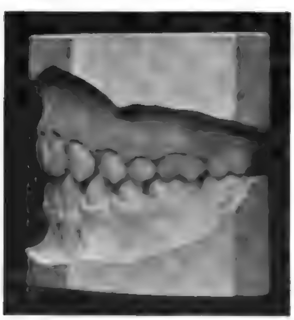

Fig. 11.—Eby Case, left side view of model.

Fig. 13.—Eby Case, left side models apart to show the vertical curvature.

purposely left with this tilt in order to show how errors of leveling can be quickly detected and corrected. (Note, in models of malocclusion showing marked disturbances of the vertical curvature, the operator should select by the eye the best plane of projection and then quickly make a side elevation and superimpose over a normal side elevation. Any error of leveling can be corrected at this time.)

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The centroids of the teeth are shown and the centroid of the denture at *O* calculated as described in a previous paper.[2] Also the axis of symmetry *A. B.* passing through *O.*

In Fig. 21 the vectors are drawn from tooth centroids to denture centroid at *O.* Table I compares teeth left side with corresponding teeth of right.

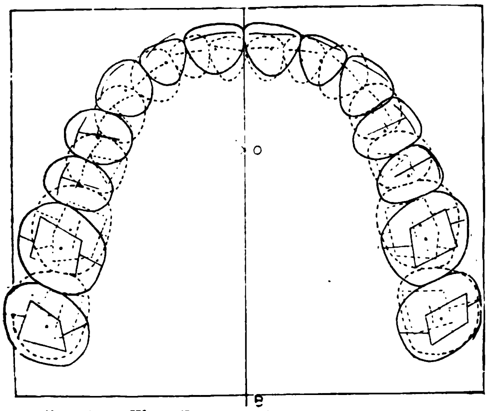

Fig. 14.—Eby Case, horizontal map upper and lower, uppers in solid line, and lowers in dotted line, axis of symmetry *A.B.* Centroid of denture at O.

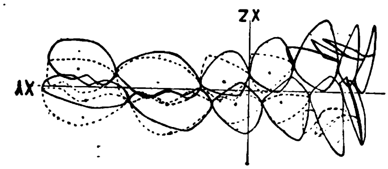

Fig. 15.—Eby Case, side elevation, right.

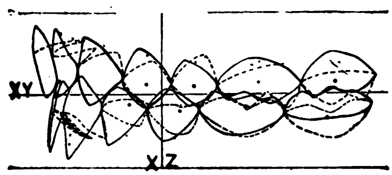

Fig. 16.—Eby Case, side elevation, left.

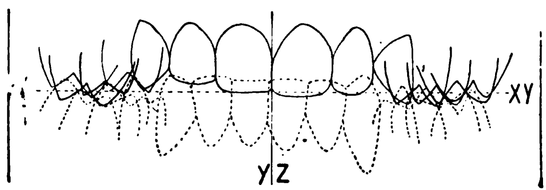

Fig. 17.—Eby Case, front elevation.

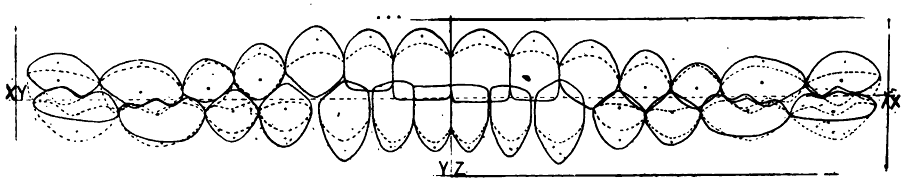

Fig. 18.—Eby Case, profile development.

TABLE I

ANGLE OF VECTORS		LENGTH OF VECTORS	
R°	L°	R	L
13.5	10.0	11.9 mm	11.8 mm
15.0	15.0	13.3	13.3
33.5	30.5	13.7	13.6
41.0	41.5	15.0	15.0
53.0	51.0	15.6	14.7
63.0	63.0	16.9	17.1
74.5	74.0	17.1	16.6
83.5	85.0	18.1	18.9
94.0	95.0	19.9	19.0
100.0	101.0	21.3	21.8
114.0	114.0	24.6	24.8
117.0	117.5	25.9	26.8
130.0	130.0	32.3	33.0
131.5	131.5	33.3	34.2

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Note the remarkable symmetry, in the length and angle of the vectors in a normal case.

In Fig. 24 are shown lower teeth, gum outline, incisal edge, and cusp formation. *In normal occlusion there is a definite relation* existing between the incisal edge, cusp pattern, and the gum outline. This relationship is so definite that a student could be told to arrange the map of occlusion and copy the tilts of the teeth as exhibited by this map. The buccal cusps of the lower molars are three times as far from the outer gum line as the lingual cusps are from the inner gum line. This inward tilt of the lower molars may be traced through the various elevations. The degree of inclination is one of the most constant features of normal occlusion. The lower premolars partake of this lingual tip; this map could also be taken as typical of the norm.

In most races the relation of the incisal edge to buccal gum line is fairly constant. In the negroid or prognathous skulls the incisal edge may fall just outside the buccal gum line. Between these two positions the incisal edges

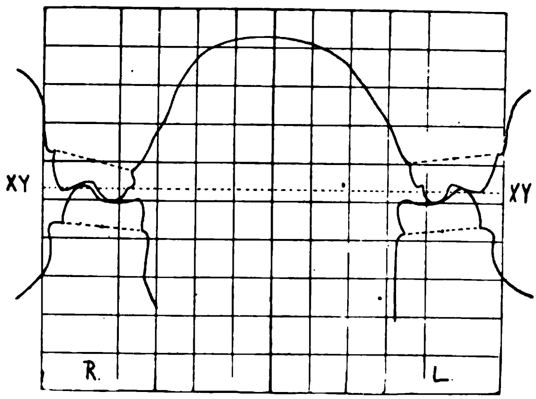

Fig. 19.

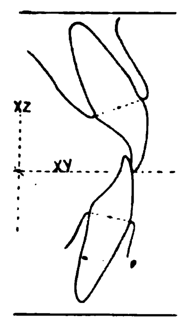

Fig. 20.

Fig. 19.—Eby Case, cross section parallel to the XZ plane through the mesio buccal cusps of the lower first molar.

Fig. 20.—Eby Case, section through the incisors parallel to the YZ plane showing the horizontal and vertical overbite (all points of crowns and gum are plotted by means of the surveying apparatus; roots are schematic).

in all types of skulls would fall. The orthodontist will agree that the teeth of this case (Eby case) are as vertical as the orthodontist ever sees teeth. (See Figs. 10, 11 and 20.)

In the average map the incisal edge should be placed on a lower incisor ½ mm. nearer the buccal gum line than in this case, Fig. 24. Fig. 25 shows the upper jaw, horizontal map. The upper molar normally presents a tilt opposite to the lower molar, the outer cusps appearing nearer to outer gum line than the inner cusps do to the inner gum line. *The amount of tilt of the upper molar is as constant as the lower molar tilt.*

When the upper premolars are normally tipped the outer and inner cusps appear an *equal* distance from outer and inner gum line.

The same rule applies to the upper incisor as to the lower. This case (Fig. 26) represents the extreme position lingually of a normal incisal edge and secretum apertum, the position of the incisal edge of a negroid skull.

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In making maps of occlusion the type of skull should determine the inclination of the incisors. In the vast majority of cases (negro excepted) the incisal edge may be drawn 1/7 of the distance (from buccal to lingual) from buccal gum line.

Lower 1/4 the distance.

The slightest error of inclination can be detected in the horizontal maps by those who have learned the appearance of the normal. An examination of the models will show the occlusion to be more perfect on the left side than on the right. An examination of the upper horizontal map shows the second right premolar to be distinctly tipped outward. [Note relation of cusps to gum line (right second premolar) compared to the normally tilted premolar, second left.]

The upper left lateral is rotated on two axes as shown by the position of the incisal edge. The maps also show the right lower cuspid to be pushed out of the arch. So the reason of the poor occlusion on the right as com-

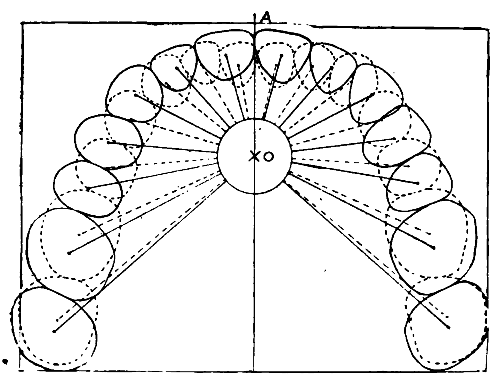

Fig. 21.—Eby Case, upper and lower "gum bodies" upper solid line, and lowers dotted line. Vectors connecting the tooth centroid with the centroid of the denture at O.

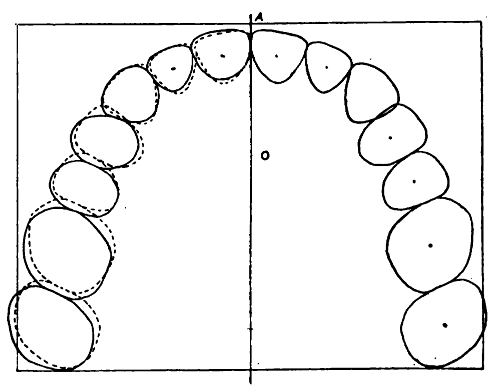

Fig. 22.—Eby Case, gum bodies of the upper solid line right side folded on left and traced over the left with dotted lines. Folding was done on the axis of symmetry.

pared to the left is readily recognized and understood as soon as the maps are examined.

In Fig. 23 the lower map has been folded on the axis of symmetry and the right side has been traced in dotted line over the left side showing a remarkable symmetry. (Note how lower right cuspid has been pushed out of line.)

Fig. 19 is a cross section of the teeth, palate and processes, through the mesio-buccal cusps of the lower first molars in a plane parallel to the XZ plane. (Note trace of the XY plane showing the models were correctly levelled from right to left. Slight error of leveling was from front to back only.) If the map be folded on the axis YZ the remarkable symmetry of the palate can be seen. The dotted axis of the lower molar together with tooth centroids fall exactly over each other when the right is folded over the left.

Recapitulation of features of normal occluson as found by engineering instruments.

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Outer cusps and incisal edges on a smooth curve.

Arch forms are on open and closed curves. Ex. Ellipse and parabola and kindred curves.

Most human arches vary but 5 mm. in width (one side).

Most human arches vary within 13 mm. in length (from buccal groove line to upper incisal edge).

Variation in width 52 to 62 mm. (buccal groove upper first molar taken on a line connecting mesio- and disto-buccal cusps).

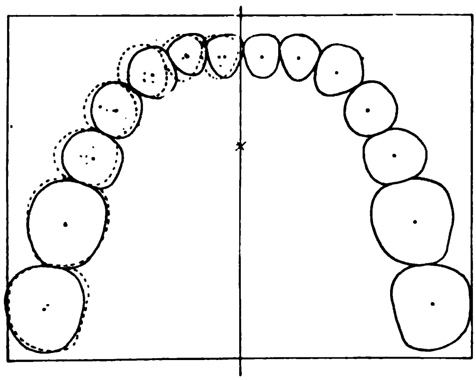

Fig. 23.—Eby Case, lower gum bodies solid line map folded on the axis of symmetry and teeth of the right traced in dotted lines on the left.

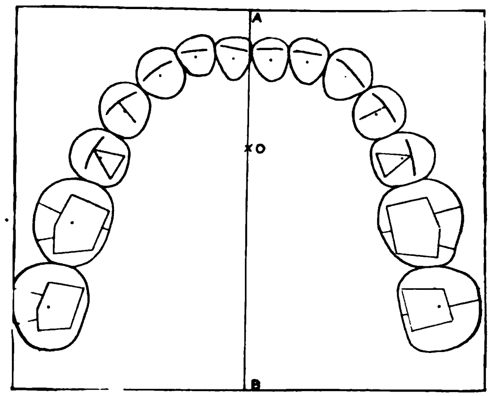

Fig. 24.—Eby Case, the lower teeth showing gum body cusp pattern, and grooves and incisal edges, to illustrate the tilts of normal teeth.

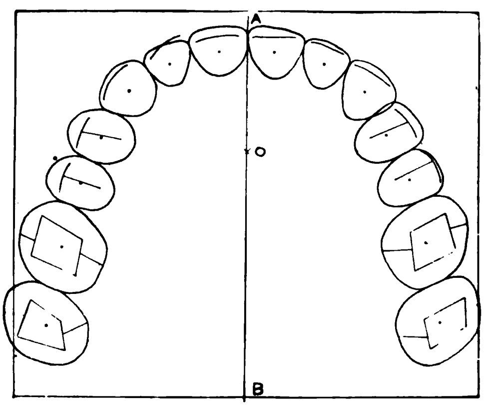

Fig. 25.—Eby Case, uppers gum bodies, cusp pattern, grooves and incisal edges, to illustrate the normal tilts of teeth first molars, left premolars, left central normally tilted, left lateral and right second premolar abnormally tilted.

Variation in length from 1 to 34 mm. These variations were noted from measuring normal skulls of widely different races including Eskimo, Negro, and Mongolian types.

In our predetermined arches (677) we have never gone beyond the range of variation in length. We have made them slightly narrower than 52 and slightly wider than 62. Constant relation of cusps and incisal edges to the gum figure guiding us to a proper inclination of tooth. We will now proceed, having briefly reviewed the previous art, to describe the technic of *arch*

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determination, always bearing in mind the aforementioned data of orthodontist, anthropologist and engineer.

In May, 1905, *Cosmos,* Hawley wrote of the determination of the normal arch and based his plan on the Bonwill triangle. Hawley accepted the Bonwill triangle as correct and sought the aid of mathematicians to find the equilateral triangle when the size of the teeth is known. They gave him a correct formula if his premise (the Bonwill triangle) had been correct, but unfortunately Dame Nature never used an equilateral triangle to design

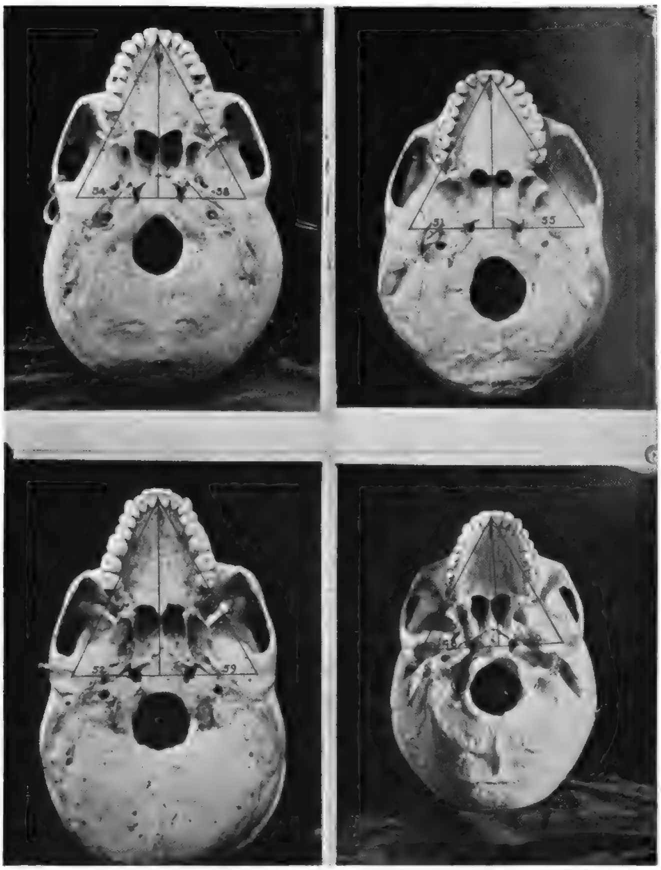

Fig. 26.

Figs. 26, 27, and 28.—Skulls from the collection of J. Leon Williams, error of the Bonwill theory graphically shown.

human jaws. In his Dental Anatomy Tomes speaks of "the fantastic theory of the late Dr. Bonwill that the form and relations of the jaws are referable to the developments of a triangle, does not call for serious discussion and it would not have been mentioned at all here had it not been unaccountably admitted in certain recent text books." Hawley should be given the credit of foreseeing the value gained by the orthodontist from accurate arch predetermination, but it is unfortunate that Hawley fell under the sway of the fallacious Bonwill triangle, especially as the Hawley charts have been widely used by orthodontists and orthodontic teachers.

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The next three illustrations were loaned by J. Leon Williams and they graphically show the error of the Bonwill theory.

Fig. 29: on the right the largest and smallest Hawley arch (½); on the left a diagram showing the range of normal arch variation at buccal groove of first molar of 5 mm. and variation of the length of normal arches from buccal groove line of first molar to incisal edge 13 mm. (21 to 34 mm.). Note the Hawley arch is always the same inflexible form varying in size with the increase of size of teeth; Hawley's *shortest* arch is his *narrowest*. Note on

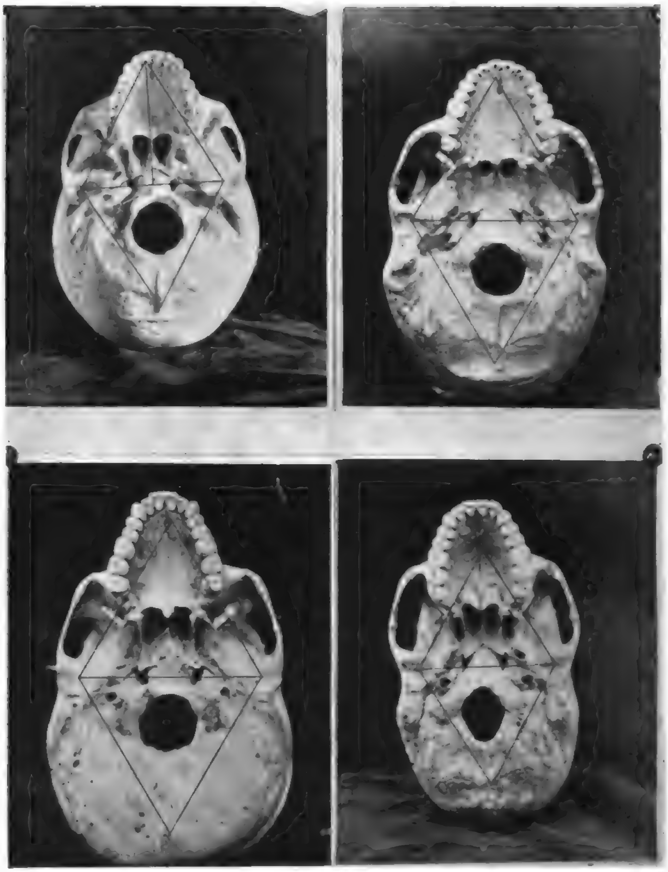

Fig. 27.

the left how the curves cross; the narrowest arch is the longest, and the broadest, the shortest. The dotted lines connecting the charts show the incorrectness of the Hawley Chart in plotting the positions of the centrals when compared with the wide range of these teeth in normal skulls.

The symmetroscopes of Gruenburg, Friel and others were the next great steps in measuring the symmetry of arches and later the Morse chart, a ruled grid on transparent celluloid, was found a great help to many orthodontists in testing the symmetry of dental arches. By far the most efficient method of predetermining arch form, devised by whom I do not know, is the sectioning of models and rearranging the plaster teeth in wax.

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The Technic of Arch Determination.—The case selected to illustrate arch determination I have chosen from Dr. Dewey's clinic. It presents many interesting features not only for arch determination but also for map placement. In a previous paper[2] photographs of this model were illustrated. The first step in arch determination is to make a horizontal map (enlarged 10 diameters) as shown in Fig. 35.

Second step to mark the centroids on all the teeth and calculate the centroid of the denture which will be found at *O*.

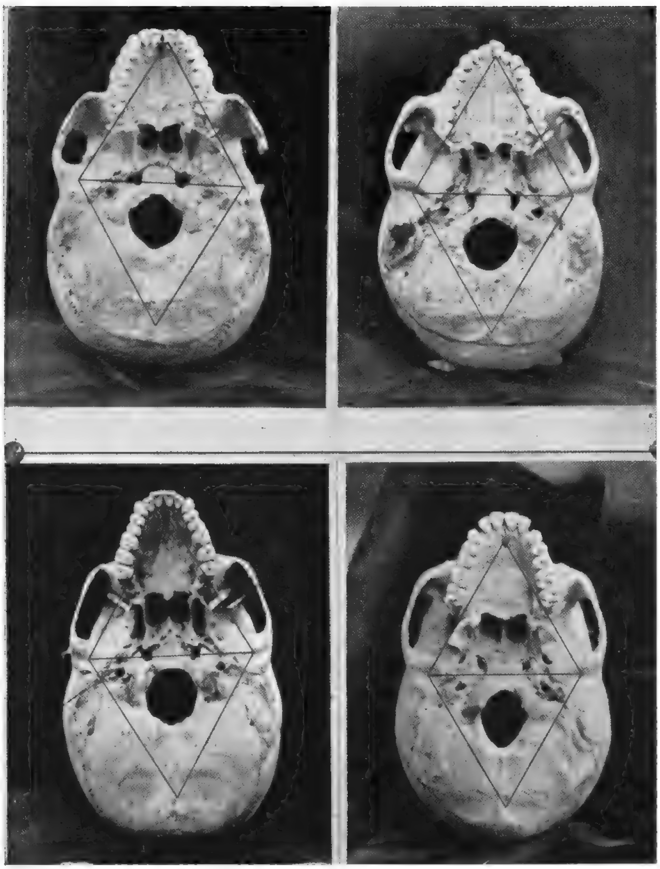

Fig. 28.

Third Step.—Apply the formula of "least squares" and find the axis of symmetry and trace on map the line *A. B.* passing through *O*.

Fourth Step.—Measure the mesio-distal diameters of the teeth, both on the enlarged map and by caliper measurements of the models (these measurements to be made at the point of contact. If the teeth are badly tilted and distort this line, the models should be placed on surveying apparatus and normally tilted for each tooth and individual maps made of all badly tilted teeth. Normality of maps to be judged by the criteria previously laid down in this paper for the normal tilts of all teeth).

Fifth Step.—Take a transparent sheet of paper ruled in 5 cm. squares and

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place over the horizontal map, superimposing the center line of top sheet over the axis of symmetry.

Sixth Step.—Links of the occlusograph corresponding in number to the diameters are selected and connected by the occlusograph pins. We now have the upper and lower jaw unrelated. Individual maps of the upper and lower first molars are fitted together as shown in Fig. 37 and the contact lines are drawn as shown. A right angle connecting line is drawn from upper to lower at mesial of upper first molar. The length of this line determines the distance the upper and lower contact lines are apart and how much the lower molar contact is in advance of the upper when these teeth are in occlusion. This condition is now imposed on the occlusograph by selecting a suitable cross link and adjusting the sliding molar carriage to give the correct overlap of the first lower molar.

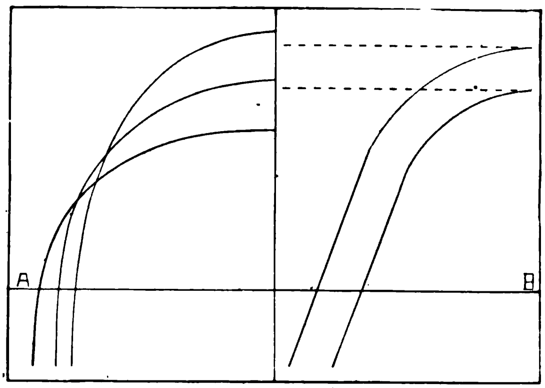

Fig. 29.—The line *AB* is drawn through the buccal groove of the upper first molars. On the right side is shown the largest and smallest Hawley arch. On the left a schematic drawing to show range of variation in the width and length of normal arches, the dotted lines connecting the two diagrams proving the inadequacy of the Hawley plan.

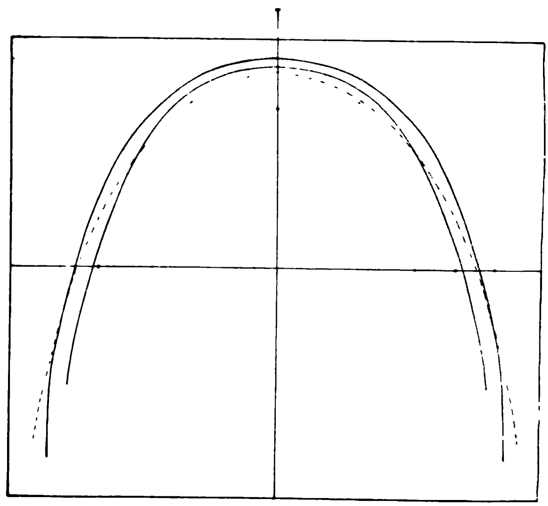

Fig. 30.—A comparison of the arch forms of Secretum apertum to Wilkes Case (dotted line) normal occlusion third (Eby case) inner solid line. The cross line represents the buccal groove line on which is marked the range of variation. The midline is the axis of symmetry. Range of variation of the length of arches is noted on this map.

Seventh Step.—Over the map of malocclusion place a sheet of transparent paper, ruled in 5 cm. squares, registering the midline of the grid with the axis of symmetry over the malocclusion map. Place the assembled occlusograph on top of both sheets, bringing the midline of occlusograph on the axis of symmetry in line with the contact line of the lower incisors over the map of malocclusion. Start and smooth out the occlusograph into smooth curves, using the grid paper as a guide for symmetry and attempting to keep the occlusograph as near the arch of malocclusion as possible, i.e., with the occlusograph lower incisors over corresponding teeth on malocclusion map, try to hold the nearest width, in the second molar region, compatible with normal occlusion. Complete the manipulation of the occlusograph by establishing occlusion in the canine, premolar and molar region, by bringing the cusp

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points of each jaw (on the occlusograph) opposite the points on the opposing jaw, that they should occupy in normal occlusion.

If the tooth material of the upper will not stretch around the lower (this

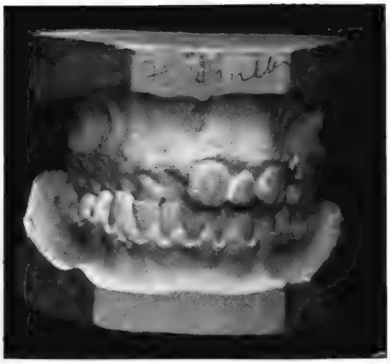

Fig. 31.—Dewey Case, front view of model.

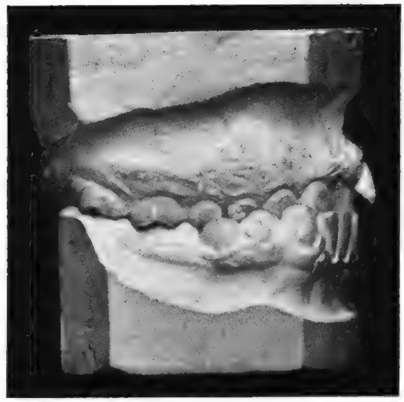

Fig. 32.—Dewey Case, right side of model.

Fig. 33.—Dewey Case, left side of model.

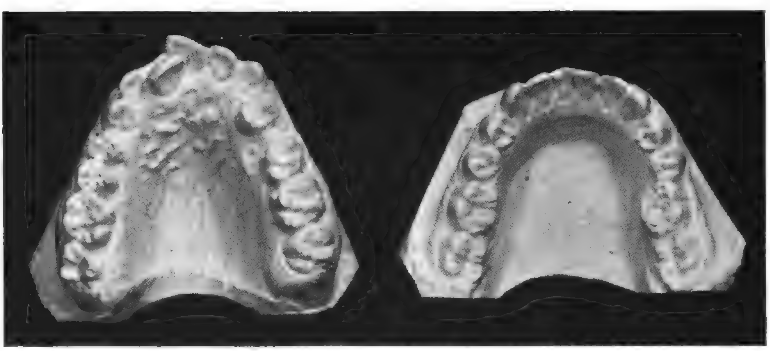

Fig. 34.—Dewey Case, occlusal view of model.

will happen in the majority of cases) the upper occlusograph should be broken at canine and first premolar contact. With this increased flexibility, smooth out the lower into a smooth curve and make the upper premolars and

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molars fit, creating small spaces between the upper front teeth. If the proper fit of molars will not give good occlusion in premolar and canine region, then loosen the molar carriage and move the upper molars back on the side and get occlusion of premolars and canine and slight distal fit of the upper first molar. This will create slight spaces between the 5 anterior upper teeth. If the expansion is extreme or for any reason little tooth movement is desirable

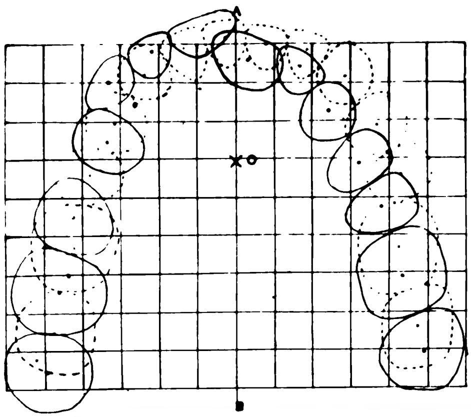

Fig. 35.

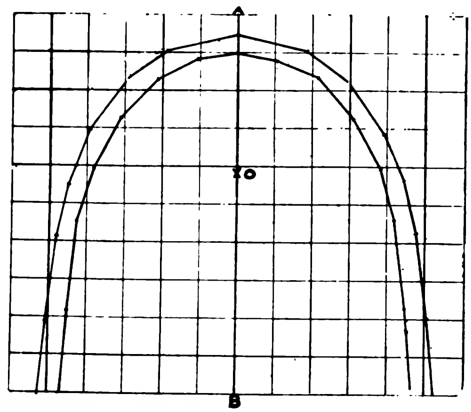

Fig. 38.

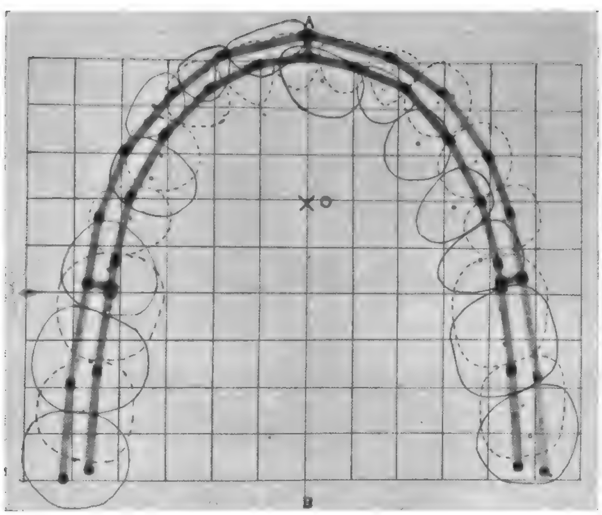

Fig. 36.

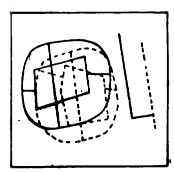

Fig. 37.

Fig. 35.—Dewey Case, horizontal map upper and lower. Uppers solid line and lowers dotted line. *AB* axis of symmetry. Centroid of denture at O.

Fig. 36.—Dewey Case, the occlusograph superimposed over horizontal map of malocclusion.

Fig. 37.—Dewey Case, maps of first molars upper solid line, lower dotted line showing the normal fit of these molars. Diagram to show the arrangement of the occlusograph links, to produce normal occlusion of these teeth.

Fig. 38.—Dewey Case, occlusograph line as predetermined by using the occlusograph.

the lower canines can be left rotated and with a slight overlapping of the lower incisors, the arch width can be materially decreased, good occlusion of the side teeth obtained with regular upper front teeth.

After the occlusograph has been arranged in the best symmetry and the

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best occlusion for the case has been found, pins should be passed through all of the occlusograph joints, appearing over the map of occlusion as Fig. 36 (note the transparent ruled sheet has been removed in order to photograph occlusograph in relation to map of malocclusion).

The pins are now removed and the pinholes connected by lines, Fig. 38, giving a form (contact line) on which the teeth may be drawn and a test made to see whether occlusion has been predetermined (note this test is made on drawing board and not on the patient).

The map of occlusion, with its drawn contact lines, is slid over the map of malocclusion registering the contact line of the lower incisor. The gum outline of this incisor is traced on the occlusion map. Proceed tooth by tooth on the lower until all of the lower teeth are arranged, with proper tilts on the occlusion map.

The uppers are similarly treated, starting with the upper first premolar, Fig. 39, fitting its cusps accurately between the lower premolars. Proceed

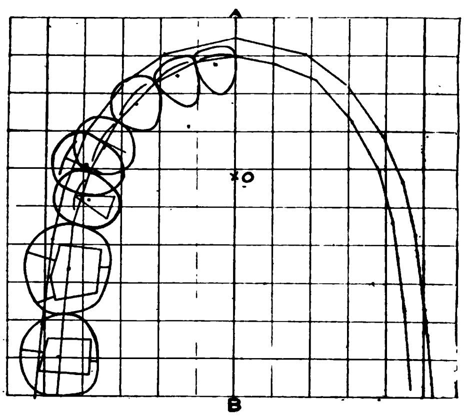

Fig. 39.—Dewey Case, showing how the teeth are drawn in on the occlusograph line by superimposing the normal map over the map of occlusion by individually registering each contact line.

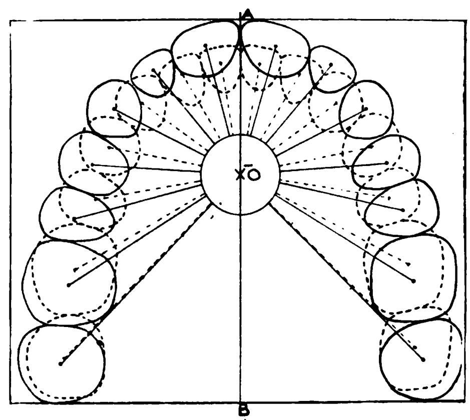

Fig. 40.—Dewey Case, completed map of occlusion *AB* axis of symmetry centroid of denture at O, vectors connecting tooth centroids with the denture centroid, upper solid line and lowers dotted lines.

tooth by tooth until the occlusion map is complete. If any error has been made in arch determination it will be impossible to draw the teeth on the contact line of the occlusion map. It is much pleasanter for orthodontist and patient to find errors of arch determination before treatment of living tissue is begun.

The completed map of occlusion will appear as Fig. 40.

The centroids of the teeth should be traced from the map of malocclusion onto the map of occlusion. The centroid of the denture will be next calculated in the same way as the centroid of malocclusion and will appear on the midline, if the teeth of the right and left are symmetrical; if they are not symmetrical then the axis of symmetry must be computed for this map.

The second division of this paper deals with map placement, to produce the minimum movement, to change from malocclusion to occlusion.

As far as I know, no one has ever written on this subject. The solution

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required six years of work in consultation with three engineers. It is with great pride that I bring to you a simple and easily applied formula.

As early as 1914 maps were related by ocular inspection and this seemed sufficient until more complicated malocclusions were examined and it was found that different workers in the office would make different placements. This of course would materially affect the proposed treatment.

Formula for map placement:

Pass a pin through centroid of occlusion map and register with centroid of malocclusion. Rotate map of occlusion until the axis of symmetry on occlusion map registers with the axis of symmetry on malocclusion map.

After the maps are related registration marks should be made at three or four convenient points and individual maps of upper and lower jaw made, showing the upper crooked teeth related to their proposed normal positions and the lower crooked teeth related to normally positioned teeth of the lower.

We will examine the treatment sheets of the Dewey case shown in Figs.

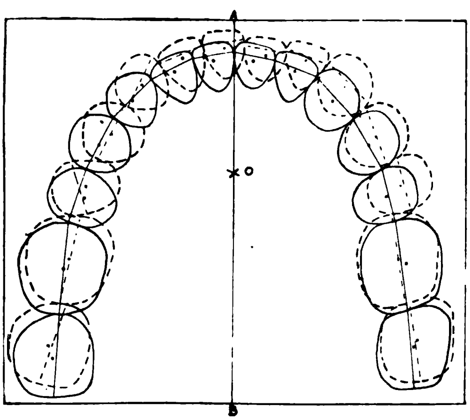

Fig. 41.—Dewey Case, lower treatment sheet showing the minimum tooth movement, occlusion solid lines and malocclusion dotted lines.

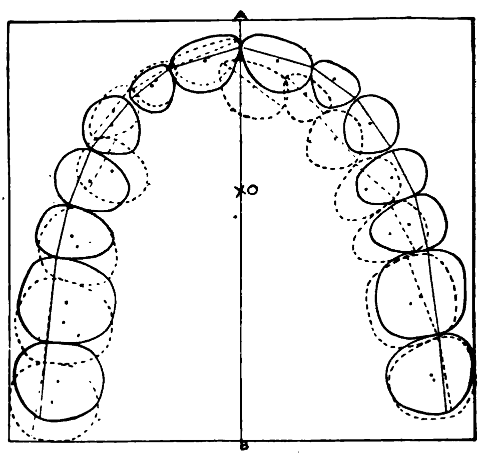

Fig. 42.—Dewey Case, upper treatment sheet showing the minimum tooth movement to change from malocclusion to occlusion; solid lines normal occlusion, dotted lines malocclusion.

41 and 42. These two maps of the upper and lower were made strictly according to the prescribed formula.

1. Horizontal map of malocclusion was made.
2. Centroids of teeth and denture were calculated.
3. Axis of symmetry computed.
4. Horizontal map of occlusion was made.
5. Centroids of teeth and denture were calculated.
6. Axis of symmetry computed.
7. Maps related by registering centroids of dentures (on occlusal and malocclusal maps) together with the axes of symmetry.

Note how well the axis of symmetry formula placed the midline.

On the lower jaw, Fig. 41, the premolars on the right were driven by the upper jaw outward and forward, causing the incisors and midline to shift to the right. This allowed the left side teeth to move forward. The left cus-

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pid moved toward the midline ⅓ of its width with the consequent forward movement of the back teeth on the left side. The left lower second molar is rotated and it is obvious that is the first tooth to be treated in order to gain space for all of the teeth in front of it. The map clearly shows the center around which the second molar can be rotated into normal occlusion (mesiolingual angle).

On the upper treatment map (Fig. 42) the effect of the retained second deciduous molar is shown in the increased length of the arch; this is further accentuated by the erupting second premolar opening a space between the first premolar and second deciduous molar.

CONCLUSIONS

1. Easily applied formulae for
   (1) Arch determination
   (2) Axis of symmetry determination
   (3) Map placement

should be of great service to orthodontists in planning treatment.

2. The mathematical approach to our specialty has shown the errors of classifications and terminology.

3. The methods indicated in this paper should lead to radical changes in undergraduate and postgraduate orthodontic courses.

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DISCUSSION

Dr. Martin Dewey, New York City.—It is rather difficult to discuss this paper in the length of time we have allotted to it, and owing to the fact that there are many points that have a bearing on this subject which we can hardly mention at this time. Probably a résumé of the opinions the dental profession have held in regard to arch predetermination may not be amiss.

If you go back to the paper of Dr. Howard, you will find in that paper certain conditions were raised which to a certain extent are also met with in this paper. When we speak of and attempt to classify types of malocclusion we have been accustomed, first of all, to get a certain amount of knowledge from the study of the model. That is one way. Dr. Howard brought out the fact that we get more information by studying the facial outline. Dr. Howard spoke of tipping of molars laterally in connection with expansion of the arches, but he gave us no idea as to how much he tipped the molars or moved them laterally; or whether he moved them bodily, because with the ordinary methods of diagnosis, study of the models, study of the face, and study of the models before and after treatment, it is difficult to arrive at a definite conclusion as to whether these teeth are tipped or moved bodily because there is no way of determining, without making a survey of a set of models, as made by Dr. Stanton. With the survey you can pick up errors and deviations from the normal that you can hardly detect with the eye as you study the model, because survey of the model is made in three dimensions and two of these measurements are translated on a flat surface.

One of the difficulties which I encountered when I began looking over Dr. Stanton's investigations and studies was that it took some time before I could interpret them correctly. The markings on the piece of paper gave me little information first, and I dare say gave

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little to you. You must become accustomed to interpreting two dimensions on a flat surface by the plane of projection. However, that is no discredit to you because it simply indicates you have not had experience in that line.

If any of you who have not studied objects under the microscope to any great extent and are interested in histological investigations, if you go into a man's laboratory who is doing histological work and he looks at a specimen, he sees a great many things that you cannot see. The histological investigator learns to interpret the histological specimen through the microscope straight up and down. However, he gets his measurements laterally and his dimensions in different directions which you do not see. That was illustrated by Dr. Bast in his paper on the study of bone cells in which he described the condition he saw microscopically, and I have no doubt that many of you were not able to follow him.

When you listened to Dr. Stanton today you must remember he gave you interpretations he had learned as a result of studying this thing with trained engineers, and those engineers have spent their entire education in studying maps.

This proposition of surveying the dental apparatus gives us information and makes our vision clearer. You see things much quicker than you would do otherwise.

When I went to Dr. Stanton's office after he was working on the establishment of maps according to the plan he has outlined, I confess that, at first glance, it seemed too simple. I did not think it would work. I had my doubts about it, but any scientific fact must be tested and confirmed. We want the results of several hundred experiments and substantiated facts before drawing conclusions. Dr. Stanton has been doing the work he has outlined to you for many years.

I got the model which you saw on the screen, which was a rather complicated case of malocclusion. I had seen some of the things on that model, and I had outlined a plan of treatment which corresponded very closely to what he showed you on the map, but I must confess that the extreme degree of accuracy with which these teeth must require movement had escaped my attention. After studying the model for a long time, the map gave information and I had a clearer insight than I had obtained before.

I have many times said that dental surveying or arch predetermination as practiced by some dentists was unsatisfactory, and that is because the general plan of arch predetermination is to consider all arches of the same shape. If you study many cases you will find that arch forms are not of the same shape any more than tooth forms are of the same shape. Any plan of arch predetermination that is not flexible, that does not allow you to make arches of different shapes is unscientific. You have heads and you have teeth of different shapes.

Dr. Howard said the other day that he did not believe that we could make a dental survey and get supra- and infra-version. The determination of infra-version has crept into orthodontic literature and we did not know what we were talking about. We have to use different terms for infra- and supra-version.

A few years ago I was trying to get you to use the terms infra- and supra-version; now I am telling you to forget them and learn something else. In other words, you probably think I do not know what I am talking about again, but you remember the late Elbert Hubbard was quite a noted lecturer and popular speaker, and sometimes advanced unusual ideas. After hearing a lecture a lady went to him and said, "Mr. Hubbard, I don't agree with everything you have written. I don't believe it." Mr. Hubbard replied, "I don't either, but I did at the time I wrote it." And that is the way with reference to supra- and infra-version. They seemed like good terms at the time we advocated them, but since studying cases from an engineering standpoint these terms are incomplete.

Dr. Abell used the terms supra- and infra-version, but later on he said up and down. That is what you get by studying these maps and surveying the dental arches. You consider tooth movements as anterior and posterior, and you also consider up and down.

You have three planes to consider in tooth movement, one laterally, another antero-posteriorly, and a third up and down. That goes back to the proposition, are we going to gain anything from arch survey as regards "ups and downs" as applied to the plane of

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occlusion? We can as regards the relation of the incisors to the molars. When we consider the tipping relation of the teeth which my good friend Howard did not consider and talk about expanding the arch to move the teeth out, he did not say whether he tipped them or moved them bodily, but in checking up results and in making surveys of progress, we can go a little farther in regard to the up and down of arch relations. Engineering methods hold out the possibility of absolutely determining the position which the dental apparatus occupies in the face. It is possible for engineers to analyze and locate the dental apparatus in its relation to the face. That is what Dr. Howard wants, and that can be done by engineering methods.

Dr. Stanton has prepared with the aid of Mr. Fish a complete set of drawings, to construct such a surveying apparatus. The unfortunate thing about it is that it is rather expensive, but instruments can be designed for a certain thing by engineering methods and successfully used and they might not need much improvement in later years.

Dr. Barnes' paper the other day was a masterly contribution which consumed two and a half hours in its presentation. He very often spoke of arch predeterminations and showed cuts made from measuring six central incisors. That will not work because you are only taking one group or case and making the other group the same width without regarding the the shape of the teeth or the shape of the teeth in the opposite arch. With Dr. Stanton's plan he is able to measure every tooth correctly. He can determine the contact line of the individual teeth and the arch design by the occlusograph which is built on mechanical principles as governed by engineering facts, enabling one to estimate a certain shape without changing the lengths, because they have got the anatomical relation of the molars, especially as regards the anterior position of the mandibular, and the rest of the teeth are set in the occlusograph to the proper mesiodistal diameters. Tooth substances cannot be changed in an arch.

Another thing he showed me several years ago as regards the occlusograph was that if you should happen to have a case in which your diameters "mesio-distal" of the mandibular molars and premolars are slightly smaller in comparison to the mesio-distal diameter of the maxillary molars, in such a case the arch tends to take a circular form. The posterior end of the arch curves in and you cannot make the thing fit in any other way. If you have the opposite condition, where the mandibular molars are wider mesio-distally than the maxillary molars, you will find you have one of those arches in which the posterior part turns out. These are things which have been proved and are not guesswork. Dr. Stanton starts out to survey an arch with no preconceived idea. He does not know what the arch is going to be after the thing is made until he has completed the survey.

Going back to the point of referring to the construction of an instrument with which it is possible to measure the position of the teeth and the position of the dental arch and cranium, and make measurements so that we can move the molars up and down, I believe such an instrument can be constructed, as has been done in other lines. I refer to astronomy.

Several years ago when I was in California I visited the Lick Observatory. One chap in that observatory has charted the orbit of 14,000 different stars. When we talk about the orbit of stars we do not know a thing about it; nevertheless astronomers can do it and have done it for a long time, because astronomy is the oldest science known. Also, at that observatory they have a large instrument, and some man has spent years in seeing whether the sun crosses over the earth in the right position every noon. His work is to locate the sun every day at noon and its relation to things. And the instrument he uses was built forty-five years ago. It was the first instrument of its kind constructed and cannot be improved upon today. They knew what they were doing. They made use of certain engineering methods in astronomy by which they were able to construct this instrument. Strange as it may seem, I am convinced that an instrument can be made which will actually locate the dental apparatus in the cranium to the satisfaction of Dr. Howard, although it may sound like a far-fetched statement.

I hope some time we can get the Society sufficiently interested to have such an instrument constructed, because the expense is going to be too much for even a man like Dr. Stan-

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ton to bear. If the Society is interested in scientific investigation, I believe it could do nothing better.

Dr. Stanton has only just started on this work. What he has done gives us knowledge that cannot be obtained in any other way, and a proper survey of the dental apparatus, measured in three dimensions, gives us information that we cannot get anywhere, as even the photograph only gives you one phase of it. However, if you take the model, the photograph, and an occlusograph map, you have obtained information you cannot get by any other means at present, until we design an instrument and make a survey of the dental apparatus and cranium which I hope this Society will assist in having perfected at no distant date.

Dr. Stanton (closing).—This has been a very unusual experience for me. I have been dodging practice for the last six or seven years from all directions, and I hardly know what to say. This discussion has been extremely agreeable, and it is the first time I have felt at home in an orthodontic society for many years. As I would go to the leaders of societies with my work, men would walk away and refuse to talk to me. I have been enthusiastic about this work, and I have given enough evidence to show that there is much in what I have said from an engineering viewpoint.

I did not touch on the designing of appliances. I have brought treated cases showing the devices that were in use before orthodontic treatment was undertaken, and I have pointed out how easy it is if you have a map to see what it is necessary to do, and the necessary mechanical device will suggest itself to your mind.

I will give you a further demonstration of what I have been talking about tomorrow, or I shall be glad to meet any of you in my room, for if I can maintain friendly relations with you, I am certainly going to do it. I thank you.

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TREATMENT AND RETENTION OF DISTOCLUSION CASES*

By Joseph E. Johnson, Louisville, Kentucky

Before taking up the actual treatment of distoclusion cases I will go into the technic of making the appliance.

Fig. 1 shows the method used in making my molar bands. The bands are made of irrido platinum .007 of an inch thick and $\frac{3}{16}$ of an inch in width. They are made with a loop the size of a 16-gauge bar as shown in Fig. 1 *A* and *B*. The loop eliminates the necessity of having a large number of different size bands on hand.

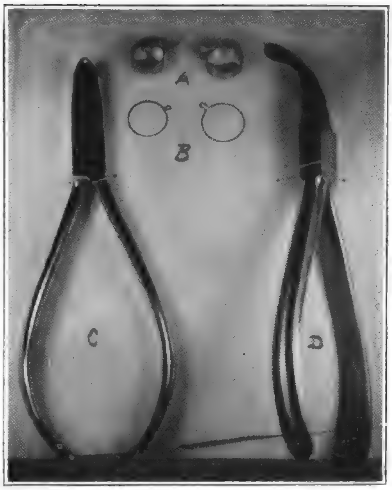

Fig. 1.

Fig. 2.

As the band is pressed down on the tooth, the loop spreads apart and permits the band to slip into place.

The bands are made in the following sizes: 1.32 inch, 1.40 inch and 1.48 inch in circumference. These bands will fit any size tooth. They are made with a flare; that is, they are $\frac{3}{64}$ of an inch larger at the bottom than at the top.

The band is drawn around the tooth with the pliers *C* and *D,* one for the right and one for the left side.

In the beaks of the pliers is a 16-gauge groove which fits over the loop on the band. The band can be drawn around the tooth very tightly by this method; in fact, care must be used or the band will tear in two.

After the band has been drawn together and burnished to the tooth, it is then removed and soldered. The bands are now replaced on the teeth and

*Read before the twelfth annual meeting of the Alumni Society of the Dewey School of Orthodontia, Chicago, Ill., April 27-28, 1922.

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a modeling compound impression is taken. No doubt you have noticed that you can get a good modeling compound impression except on the labial sur-

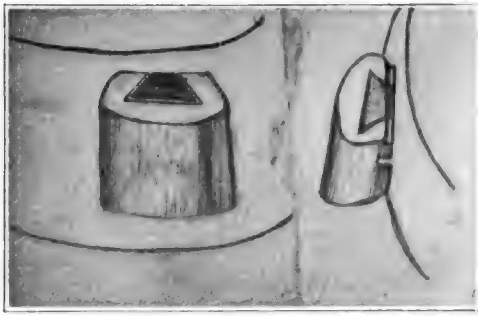

Fig. 3.

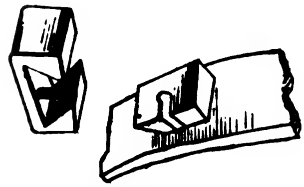

Fig. 4.

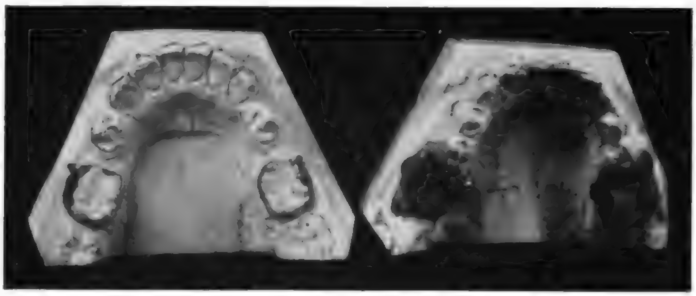

Fig. 5.

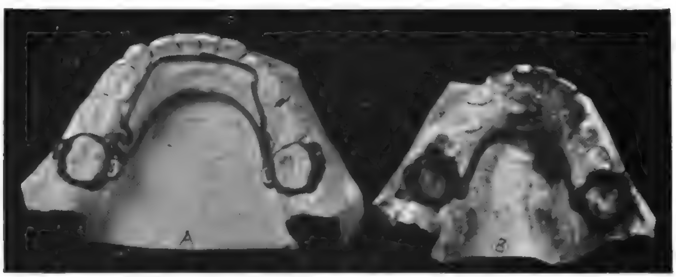

Fig. 6.

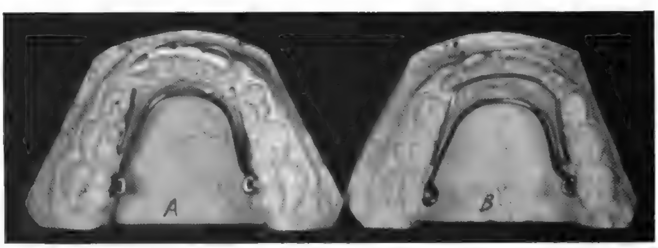

Fig. 7.

faces of the maxillary and mandibular six anterior teeth and the lingual surface of the lower molars. This is due to the angle of inclination of these

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teeth to the modeling compound as it is pressed into place, and since modeling compound does not flow like plaster, you get a poor impression of the surfaces of these teeth.

In Fig. 2 the anterior rim of the two trays has been cut away, also the lingual flanges of the lower. These alterations of the trays enable you to adapt the modeling compound to the teeth with your fingers. If the compound is chilled thoroughly before removal you will find you will have a

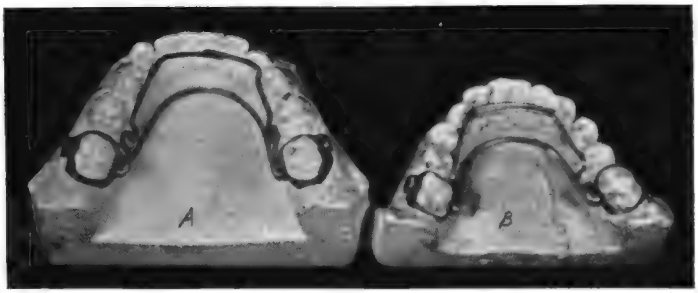

Fig. 8.

Fig. 9.

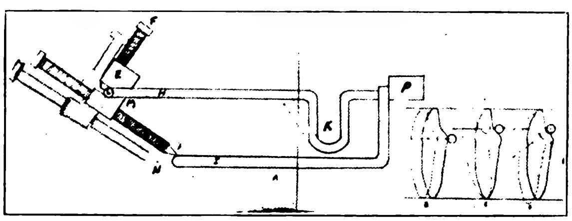

Fig. 10.

very accurate impression. S. S. White Base Plate Compound is used in taking the impressions.

In taking the lower impression, the patient is instructed to raise the tongue as high as possible so as to get a good impression of the lingual frenum. The importance of this will be shown later.

Fig. 3 shows the lingual lock. I described this lock in a paper at our 1920 alumni meeting, so will not go into detail.

Fig. 4 is an improvement on the lock just shown, as it eliminates the use of the locking pin. The slot in counter lock *A*, Fig. 4, is cut at a slight angle

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with an undercut at the bottom. When the lock *B*, Fig. 4, is fitted into place on the counter lock, the pin in *B* slides into slot in *A* and snaps into undercut, making it a very rigid lock. This is a more satisfactory lock than that shown in Fig. 3, but it is more difficult to make and I do not use it much.

Fig. 5-*A* shows the model with the bands on it. You will note that the lap on the band has not been cut off. This is left on until the appliance is finished so that attachments can be soldered to band with no danger of unsoldering them.

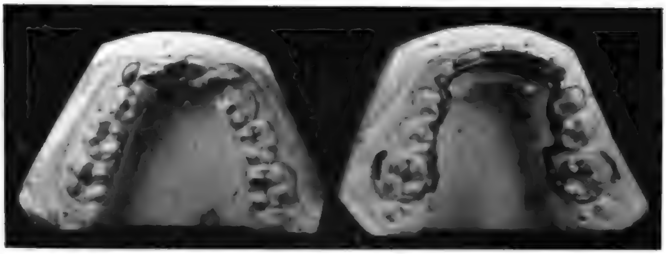

Fig. 11.

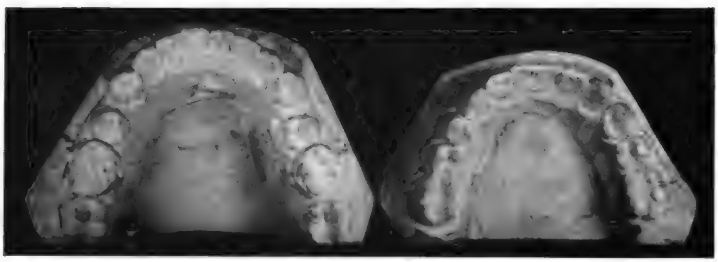

Fig. 12.

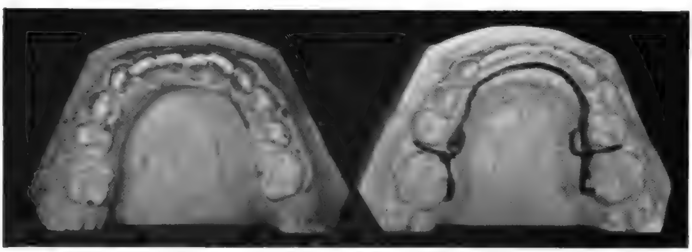

Fig. 13.

I break the banded teeth off the model and remove the plaster from the bands and solder counter lock to bands. (Fig. 5-*B*, right band.)

The counter lock is painted with chalk and the lock is slipped on. (Fig. 5-*B*, left band.) I paint the counter lock with chalk to prevent the two from being soldered together.

The body of the appliance is made of 16-gauge wire. It is adapted as low in the floor of the mouth as possible, care being taken that it does not impinge on the lingual frenum or soft tissues as Fig. 6-*B*.

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Fig. 6-*A* shows completed lower appliance. The arms of the appliance are made of 19- or 20-gauge wire; the gauge depends on the case.

Before the appliance is polished it should be thoroughly tempered.

The appliance is assembled and cemented on all at one time; then the locks will slide off and on easily. The patient is dismissed for a week and then the upper appliance is made. Figs. 7 and 8 show the different forms of lower appliances used.

Fig. 7-*A* shows the appliance I usually use when starting a case, espe-

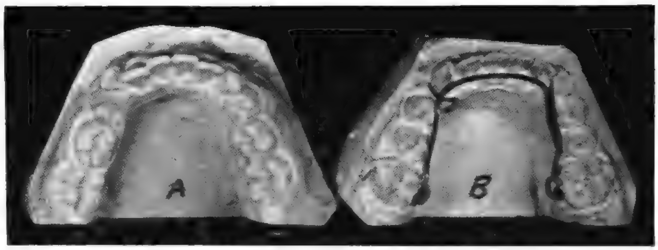

Fig. 14.

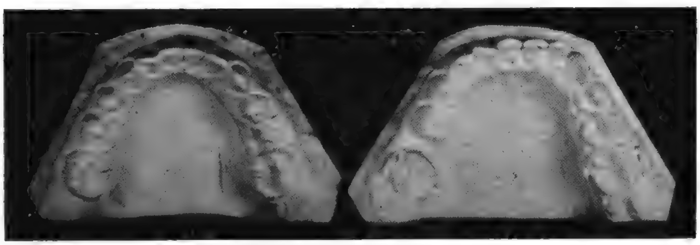

Fig. 15.

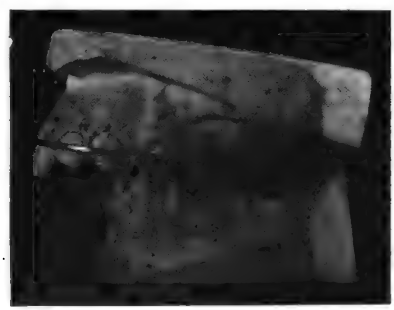

Fig. 16.

cially when there is to be a great deal of widening of the arch. After I have widened the arch sufficiently, I change to one of the other types of appliances shown.

If the six anterior teeth must be pushed forward just a slight bit, I use appliance *B*, Fig. 7.

I have used appliance *B*, Fig. 8, on most of my cases and have found it very satisfactory but it is mostly guess work to determine how much pressure you are exerting and the direction in which the force is exerted. So on my

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later cases I am using appliance *A*, Fig. 8. Force is exerted with the appliance by opening the loops.

For the sake of clearness, where the arms of the appliance are soldered together, as in Fig. 8-*A*, we will call it the lingual bar.

I have a simple little instrument (Fig. 9) by which I can tell the exact

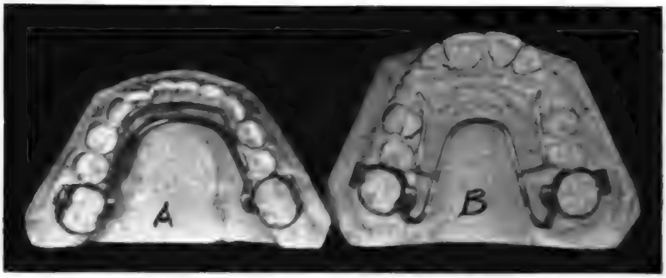

Fig. 17.

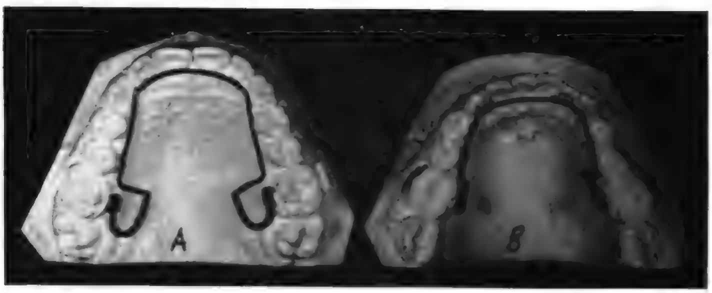

Fig. 18.

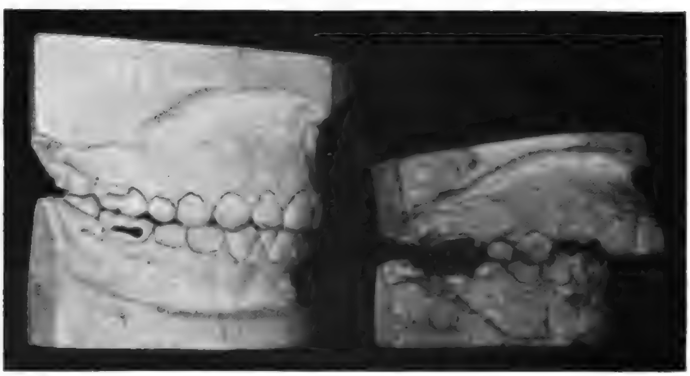

Fig. 19.

amount of force produced by opening the loop and the direction in which it is applied.

Fig. 10-*A* is a drawing of the instrument from which I will explain how it is used. The lingual bar, *H*, of the appliance fits in slot *L*, the bolt *F* is screwed down until it grips the bar *H* in slot *L* and holds the instrument rigid on the appliance. Then bolt *G* is turned down until it rests on top of body wire *I*.

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By opening the loop *K*, the lingual arch, *H*, can move in one of four directions: up or down, forward or sideways, or it can move in three directions from one pinch of the loop *K*. That is, downward, forward and sideways. In the drawing we will suppose it has done this, then the lingual

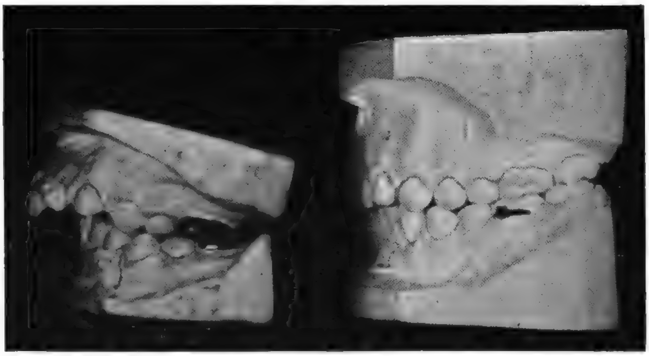

Fig. 20.

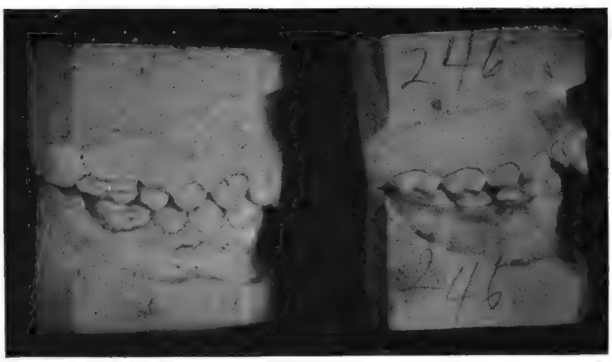

Fig. 21.

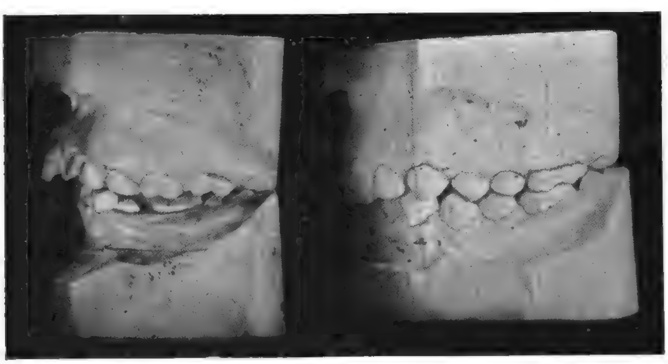

Fig. 22.

wire *H* will take the position of the dotted lingual wire *M*, the bolt *G* will take the position of the bolt *N*. The distance from the point of bolt *G* to the point of bolt *N* will show how far it has moved and in what direction. Without this instrument I do not think it possible to tell what your force is, or in what direction it has been applied.

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One of the most important things in the working of the appliance, is the position of the lingual wire on the surface of the mandibular anterior teeth.

In Fig. 10-*B* is shown the correct position of the lingual wire when you wish to move the teeth forward without depressing or tipping them.

Fig. 10-*C* shows the incorrect position of the lingual wire if you wish to

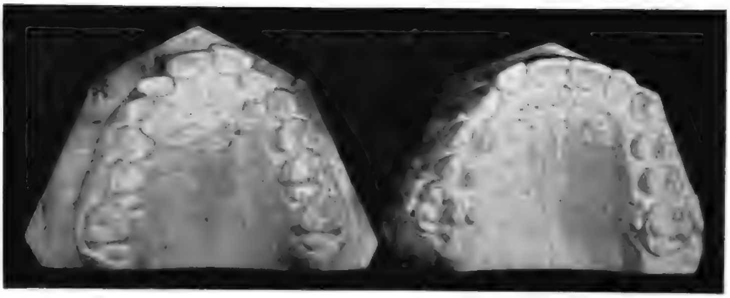

Fig. 23.

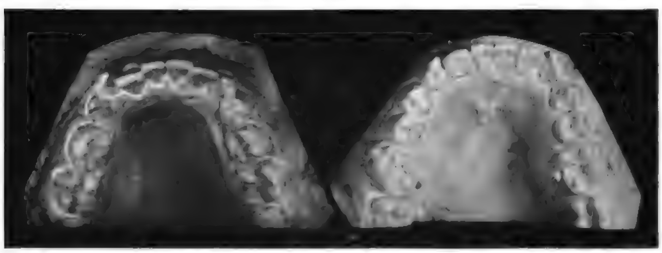

Fig. 24.

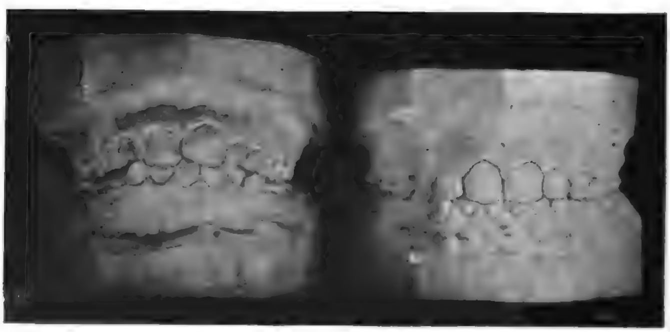

Fig. 25.

push the teeth forward. The wire in this position will tend to tip and depress the teeth as they move forward.

In a great many instances in treating distoclusion, we find we wish to depress the anterior teeth as we move them forward.

Fig. 10-*D* shows the position that the lingual wire should rest on the teeth. The force should be forward and downward.

Fig. 11 shows a case where the arch has been widened and the six anterior teeth have been moved forward into the normal position.

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The arms of the appliance have been soldered together and the body wire removed. The case is now ready to have the loops soldered to the bar to move the first premolars forward into their normal position. These loops are made of 22-gauge wire.

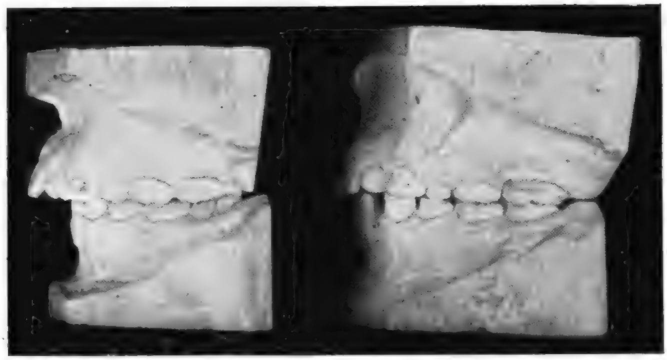

Fig. 26.

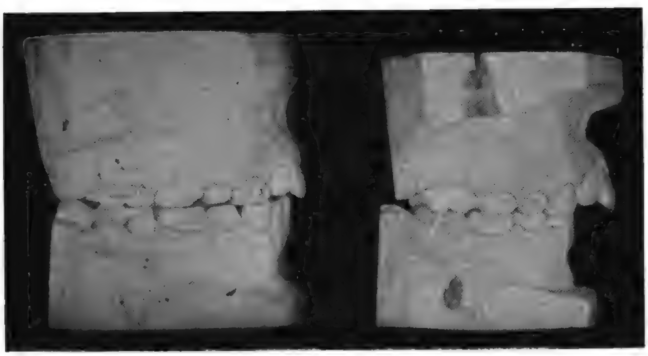

Fig. 27.

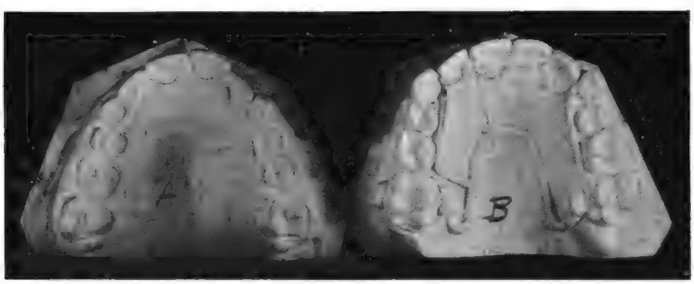

Fig. 28.

In Fig. 12 we have a case in which the first premolars have been moved forward. When I shift the loop back, to move the next tooth forward, I always solder a spur onto the bar to hold the teeth that I have moved, in position.

Fig. 13 shows the mandibular teeth after the second premolars have been moved forward. When the case has reached this stage of treatment, I usually let it rest for at least six weeks to let the teeth settle into their normal occlusion and to give Nature a chance to build bone around them.

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The lingual arch is then removed to let the intermaxillary rubbers move the molars forward into position.

The hooks on the molar bands should be as far forward as it is possible to place them or there will be a tendency to rotate the molars inward. It usually takes about a month to move the molars forward and very seldom do

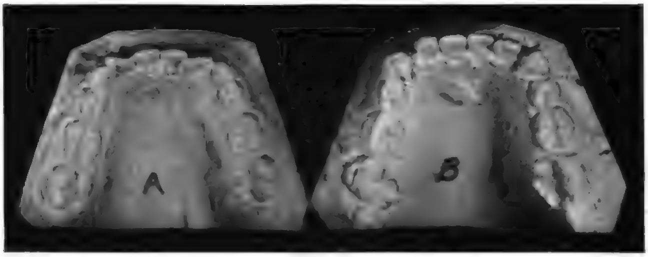

Fig. 29.

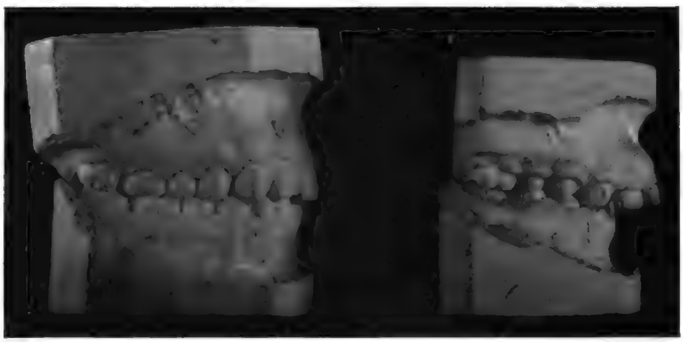

Fig. 30.

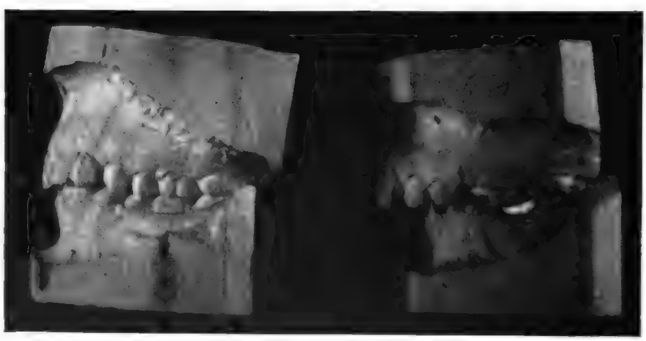

Fig. 31.

I find any drifting of the premolars backward. But if this should occur, the pull on the molars should be continued until the premolars are back into their normal position.

The lingual arch is then readjusted and used as a retainer (Fig. 17).

We will now take up a case of unilateral distoclusion. I used to find these cases much harder to treat than the bilateral, and in some instances almost impossible to bring the distal side forward into normal occlusion. By

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the method I now use, I find they are about as easy to work as the bilateral cases. The anterior teeth are pushed forward as already described, the arms are soldered together and the body wire is cut out as in Fig. 14-*B*. You will notice on the right, a finger attachment, with which the canines and premolars are moved buccally.

At the same time with finger spring posterior of left lateral or left canine as in the figure, the anterior teeth are shifted over and the premolars are brought forward as in Fig. 15. And then the molar is brought forward as in the bilateral cases.

We will now take up the treatment of the upper arch. Fig. 16 is a

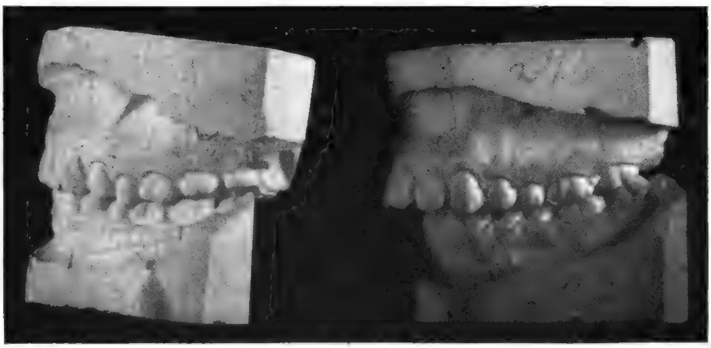

Fig. 32.

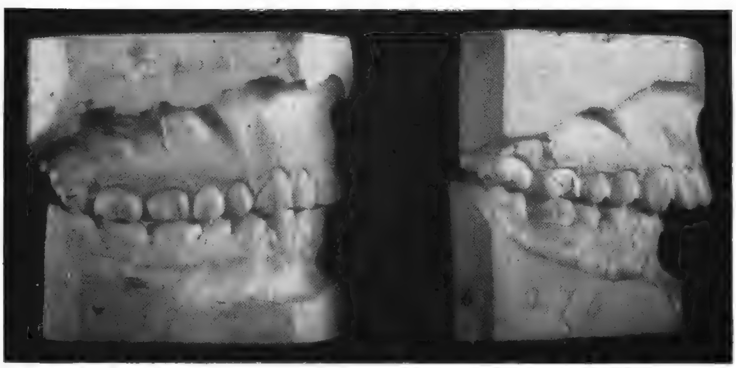

Fig. 33.

model with the arch bar in position. The tubes on the molar bands are aligned so that the arch bar will lie in a single plane. Sometimes this is impossible to do but it is better to have as little bend in the bar as possible.

The arch bar is made of 18-gauge wire. It is without threads or nuts. I will show later why a threaded bar is unnecessary. The hook for the intermaxillary rubber is just distal to the canine. The bar is not ligated to the teeth but the child is taught to take it off so the teeth can be cleaned. For intermaxillary rubbers, No. 6 Commercial bands are used. These were suggested to me by Dr. Crozat of New Orleans.

In Fig. 17-*B* is shown the maxillary lingual arch which is made of a 16-gauge body wire and 19-gauge arms. After the maxillary has been wid-

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ened and the anterior teeth drawn back to their proper place, the two arms are joined together and the body wire is cut out as in Fig. 18-*A*. This is my maxillary lingual retaining arch. You can see why nuts are not needed on labial arch wire, for with the retaining wire resting against the anterior

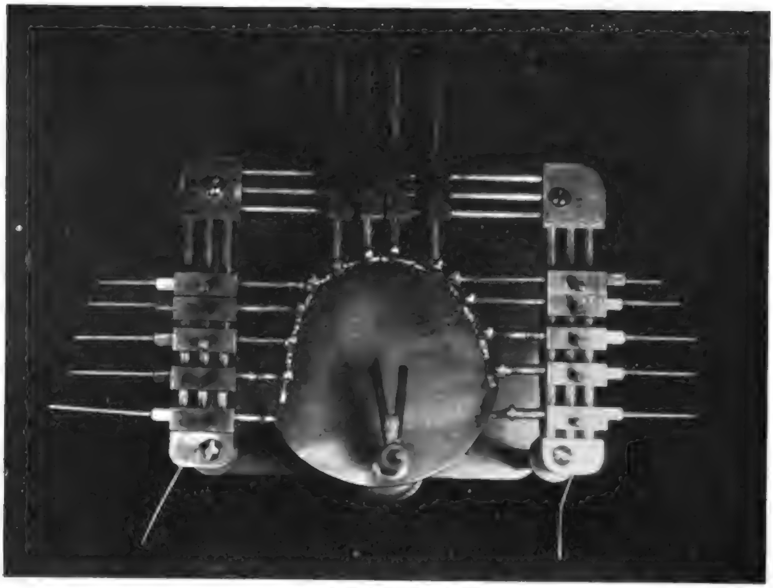

Fig. 34.

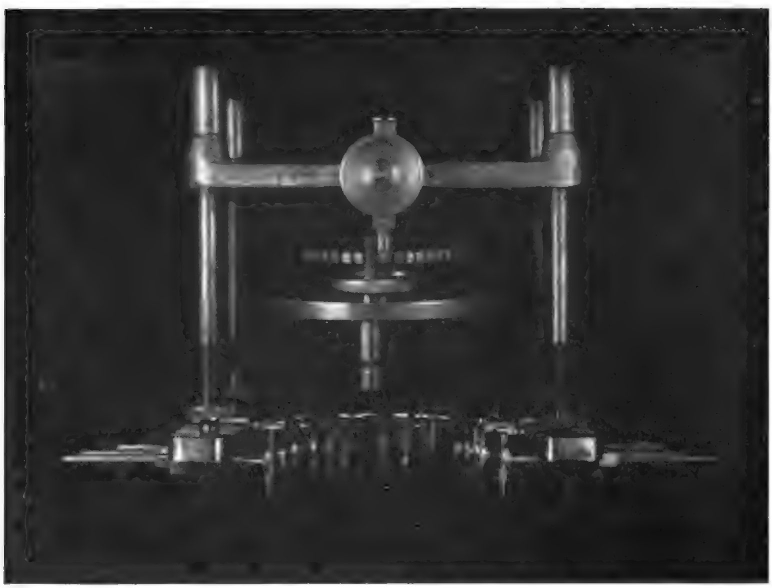

Fig. 35.

teeth, we have the whole upper arch as anchorage to move the mandibular molars forward.

Fig. 17 shows the lingual appliances on case when started. Fig. 18 shows retaining appliance in the same case.

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After about eight months of retention, the patient is allowed to leave the labial arch off in the day time but wears it at night.

After four to six months, if the teeth have remained in normal occlusion,

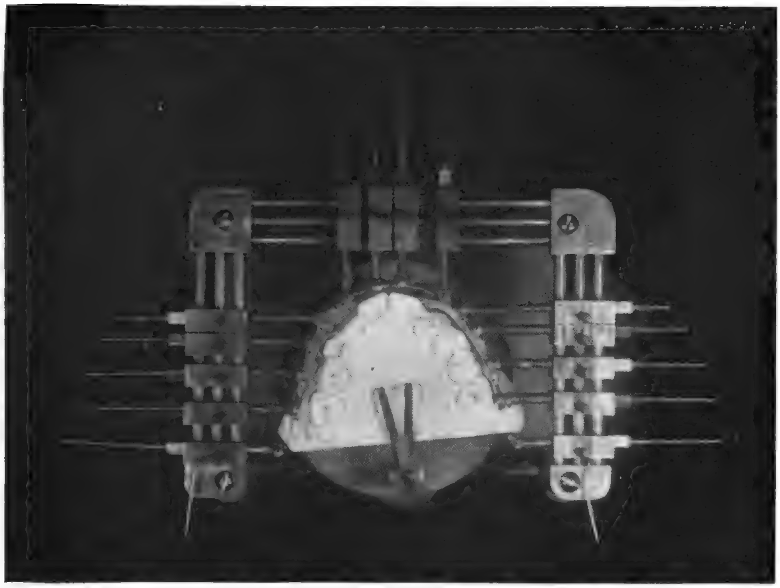

Fig. 36.

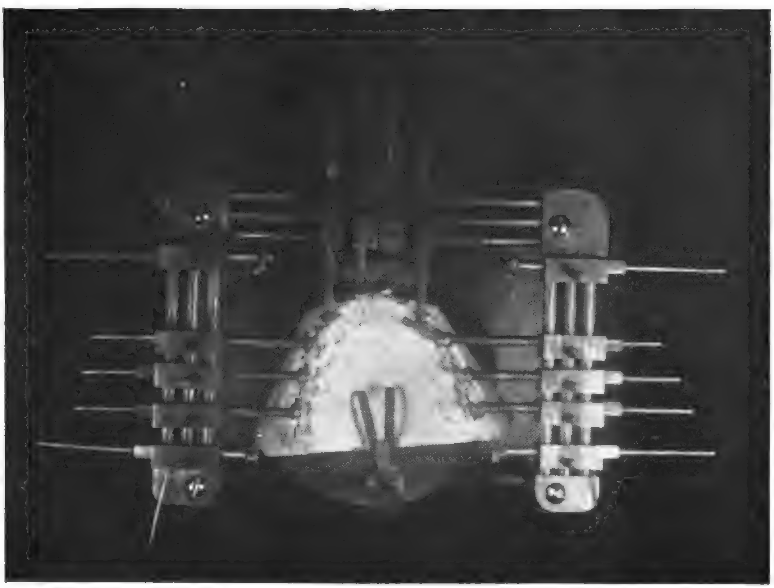

Fig. 37.

the patients are permitted to wear the bar two nights a week until gradually they discontinue it altogether.

The lingual appliances, both upper and lower, are worn at least a year after the teeth are in normal position; then the pins are removed from the

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lock and the patient is instructed to wear them at night. Figs. 19 and 20 are the right and left views of Figs. 17 and 18.

Figs. 21 and 22 are right and left views of a unilateral distoclusion case before treatment and after left molar has been brought forward.

Figs. 23 and 24 are lingual views of this case. You will notice that the four mandibular incisors have drifted slightly to the lingual. This is easily corrected when lingual appliance is readjusted.

Fig. 25 is a front view. Please note the correction of the median line in this case, which was accomplished by shifting the mandibular anterior teeth to the right, as shown in Fig. 14-*B*. This is a picture of this case while being worked.

Figs. 26 and 27 show the right and left views of a case that has been under treatment about five months, intermaxillary rubbers having been worn about two months.

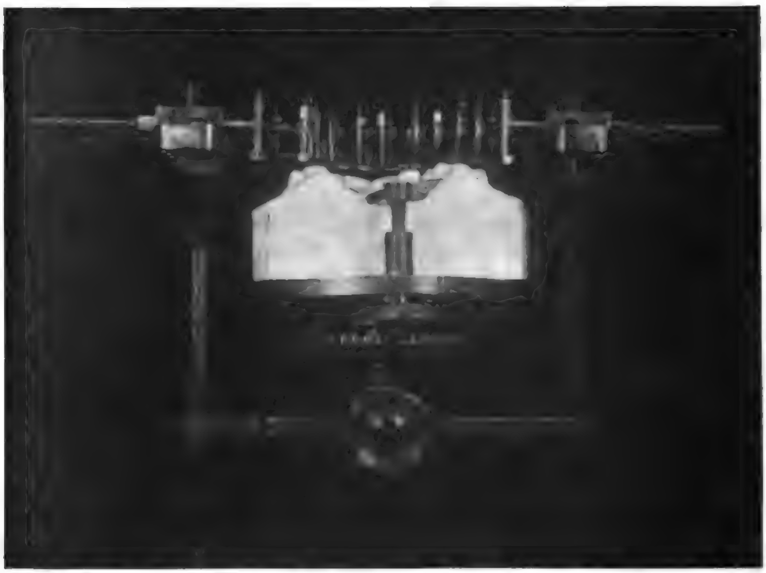

Fig. 38.

Figs. 28 and 29 are lingual views of the maxillary and mandibular models of this case. Fig. 28-*B* shows the upper lingual appliance in position. The arch has been widened sufficiently and the anterior teeth have been drawn back enough, so the arms of the appliance can be soldered together and the body wire can be cut out as in Fig. 18-*A*. The mandibular arch has also been widened enough and the four anterior teeth pushed forward into their normal position. (Fig. 29-*B*.) The deciduous molars are now ready to be brought forward by the method already described.

Figs. 30 and 31 are right and left views of another case. In this case I wish to call your attention to the supra-occlusion that has also been corrected.

Figs. 32 and 33 are the right and left views of another case.

I wish to warn you of the dangers of tipping your molars. This is usually due to exerting too much force, or applying the force too frequently. The appliance should never be spread more than $\frac{3}{64}$ of an inch and force

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should not be applied oftener than once a month. If there is the slightest tipping of the molars, I put bands on the canines with lingual lugs to hold the anterior part of the appliance down.

Before closing I wish to show you some slides of an arch predeterminer I am using. Figs. 34 and 35 are side and top views of the machine, Figs. 36, 37 and 38 are views of the machine with model in position.

DISCUSSION

Dr. A. C. Gifford, Oshkosh, Wis.—Mr. President, Fellow Alumni, and Friends: To discuss a paper such as we have heard from Dr. Johnson is no easy matter, inasmuch as he has elaborated upon his particular plan of treatment and method of making his special appliances to do the things he has shown us here today, all of which have taken much time to perfect and master. It is very pleasing to me to see the mode of his procedure in moving the lower anteriors and premolars forward, for it seems Dr. Johnson and I have been working along the same lines without either of us knowing what the idea of the other was. For some time I have moved the anterior teeth forward in these cases just as the essayist has, but have not felt quite like it was a decided success; for there are several complications in this method, one I found was to keep the anterior teeth forward until I had the molars in contact. This I have not always succeeded in doing, even if they were put in normal occlusion.

I believe though that the method is faster if all the appliance is active and moving the four anteriors as swift as the premolars and canines. Otherwise there would be that bunching up of the anterior four to get out of the way of the teeth moving straight forward, namely, the canines and premolars.

It has been my desire to discontinue the intermaxillary elastics in these distoclusion cases when possible, as I find in my practice, as I suppose you all find, that the elastics or equalizing bands as Dr. Jackson calls them, are very easily removed, and if the case is for one of the high strung nervous individuals the progress is slow, inasmuch as the elastic bands are worn but little. It is the correct way I believe to place the teeth in alignment before the correction of the distoclusion is attempted. In the correction of the distoclusion I differ somewhat in the appliances on the maxillary arch. I see no need of an appliance that has a removable anterior bar, as a band placed on the canines and first molars connecting them on the lingual with 19-gauge wire over the anteriors with a small 23-gauge wire with hooks on distal ends, does the work very nicely and the anterior wire being small makes the cleansing easy.

Retention in these cases, unless the subject be of the development stage, is almost as difficult as the treatment to correct the case. I have given up trying to grow chins on people past the development stage, and unless the case is one where I know the results will be satisfactory, I change my method of procedure. I have found also that occasionally we must discontinue treatment on these cases for the process does not always bend, but is absorbed labially at the roots of the anterior teeth, and gingival margin of the gum breaks and we have a dipping down of the soft tissues that never regenerates.

Dr. Johnson spoke of breaking the tooth with the molar band off the model to solder the lock. Would it not be better to coat the inside of the band thinly with wax, and after the model was hard to warm the band and slip it off the tooth, thereby having a tooth to place your band back on, that would assure one of having it where it was originally, thereby facilitating the making of the remainder of the appliance.

I would like to ask Dr. Johnson why he anneals his appliance before placing it in the mouth?

Dr. Johnson (closing).—I have never seen the need of coating the inside of the band with wax, for when you break the banded tooth off, a line is left on the model, plainly showing where the band has been.

I should have used the term, temper, instead of anneal.

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ORTHODONTIA*

By D. S. Sterrett, Erie, Pa.

ORTHODONTIA is a science which pertains to the treatment and correction of deformities of the jaws and irregularities of the teeth.

As to Its History and Development much has been written, but it must be summarized by the simple statement that individual attention to a small extent has been given to orthodontic needs as long as efforts have been made to practice dentistry. It was first brought to a scientific basis and offered as a postgraduate course of study in 1900 and since then has been studied and practiced by an ever-increasing number of men.

As to Its Present Status there are about 630 registered in the orthodontic directory, representing 25 countries. About half of these are practicing in the U. S. A.

As to Frequency of Occurrence it may be stated that approximately 75 per cent of the children of the present generation are afflicted with some sort of irregularity or malposition of teeth which interferes with their proper function.

As to the Causes of Malocclusion we consider five general groups in the order of their frequency of occurrence.

Mouth Breathing—account of nasal obstruction.
Malnutrition—either during the formation of the teeth or during the period of bone development. May result from faulty diet or diseases of childhood.
Dental Decay—especially of the deciduous teeth.
Habits—finger, lips, tongue or pacifier.
Loss of Teeth—unusually early or late, accidental or otherwise, also the very early or tardy eruption of teeth.

SYMPTOMS OF VARIOUS TYPES OF MALOCCLUSION

Mouth Breather.—Caused by nasal obstruction or habit, or both. The muscular pull of the mandible retards the proper development of the upper jaw; it remains narrower than it should be, increases in height and forward growth. The increase in height is the result of a lack of downward growth. The excessive forward growth interferes with the lip development, causing the upper lip to atrophy and the lower to hypertrophy.

Mouth breathing dries the mucous membrane lining of the mouth and throat, discourages salivary secretions, results in inflammation of the mucous membrane with frequent infection, bad odor and taste, thickening of the ear drums, frequent ear infection, greatly decreases the amount of air taken into the lungs, results in scanty supply of oxygen to the blood, with the blood

*A short talk given before the Rotary Club at Erie, Pa., with the idea of supplying orthodontic information to the public. Published as suggestions to other men who are called upon to present orthodontic information to the laity.

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only partly purified, produces lack of red blood cells, anemia and a low resistance against the invasion of almost any kind of disease.

The typical appearance of a mouth breather is an underdeveloped lower jaw, and a narrow, protruding upper jaw. The arrangement of teeth in these jaws is such that half of the teeth do not touch their opponents and the other half do not fit very well.

Air and food are indispensable to growing children. Noses that breathe and mouths that chew are indispensable to the proper preparation of air and food.

Nasal passages obstructed by adenoids, and teeth malposed defeat the efforts of the body to function normally.

Malnutrition, Diet, Disease and Dental Decay.—These produce a different type of oral deformity which is briefly described as crowded teeth, or rotated teeth, one or more of the teeth meeting their opponents on the wrong side, which is about as effective as cutting with the back of the blades of shears—single teeth erupting inside or outside of the row. The constitutional effects are mild or severe during childhood depending on the comparative usefulness of the teeth or the resistance of the child, but eventually a physical breakdown is experienced.

These are the types of cases which furnish recruits for the large number of people who spend their spare time having their pyorrhea treated, and almost without exception, require much more dentistry to keep their mouths comfortable than persons with regular, proper functioning teeth.

Habits of sucking or biting thumb, lip or tongue, frequently produce deformity all out of proportion to the importance usually conceded these habits. The part of the upper jaw affected consists of two tender pieces of bone in the process of uniting with the rest of the jaw bone and is not strong enough to resist distortion by such a habit. These habits frequently help to develop habits tending to disturb the nervous balance of a child, and are considered important for that reason as well as because of the facial deformity they cause.

Deformities caused by early or late eruption of teeth, missing or supernumerary teeth, unwise extraction of teeth or accident generally start as a matter of minor importance, but if a single tooth is removed or out of alignment, and the consequent weakening of the line or arch of teeth causes a person to discontinue chewing on one side because it hurts, the consequences become serious in a short time. It means the loss of 14 teeth and three salivary glands to the food and to the other digestive organs, and the teeth themselves, with their surrounding gum tissue and supporting bone are more susceptible to disintegration on account of the lack of exercise.

The Treatment of Cases is usually begun between the ages of six and twelve at a time when bone is easily influenced and tooth roots are not fully developed. The best results are frequently secured by cases which receive attention as soon as symptoms of malocclusion are noticed. The youngest case I have seen under treatment was three years, the oldest, with the exception of treatment for war injuries, about twenty-five. The first mentioned was very difficult to begin, the other very hard to finish.

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The Physiology of Treatment depends upon the principle that a steady gentle force transmitted to the bone will result in bone cells changing the structure which permits the roots of a tooth to move into the proper position. Obviously this is most easily accomplished during the time that natural growth is occurring in that bone and the jaws reach practically their adult size by the age of twelve years. From then on the possibilities of orthodontic aid become more and more limited.

The Mechanics of Treatment depends upon engineering principles with regard to anchorage and resistance, and the physical qualities of metals and other materials used.

The result of treatment of any particular case is problematical, depending upon the skill of the operator, and his ability to diagnose the cause of a malocclusion and restore that person's normal growing power, also depending upon the patient's attitude and cooperation. The number of visits or amount of appliance or type of appliance used is of little importance compared with other factors.

Results, however, must on the whole be quite satisfactory or those who undertake this work would soon find themselves without a practice. Also results in many cases are spectacular in the improvement produced in the health and appearance to a degree that goes far to repay the operator for the trials incident to the professional life of one who works continually with children.

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NICKEL SILVER LINGUAL WIRE*

By Martin Dewey, D.D.S., M.D., New York City
Associate Professor of Orthodontia, College of Dental and Oral Surgery

IN the October, 1920, issue of *The International Journal of Orthodontia and Oral Surgery* is an article by Dr. Anema upon the use of the nickel silver lingual wire with the stretching pliers.

It has long been known that hard-drawn nickel silver possessed properties which rendered it suitable for wire-stretching, very similar to iridio-platinum. However, the difficulty was that when nickel silver was soldered with hard solder the temper was lost and it became too soft. Dr. Anema showed that nickel silver could be used for lingual wires if attached to the bands by means of soft solder.

Shortly after the publication of his article, a case appeared in the clinic which required the rotation of the first maxillary incisor as shown in Fig. 1. The case only required a slight expansion and the use of iridio-platinum was contraindicated because the patient could not afford to pay for such an expensive appliance.

In order to test the possibilities of a soldered lingual wire made from nickel silver as suggested by Dr. Anema, we constructed the appliance as shown in Fig. 1, used the principle of wire stretching to produce a slight expansion, the finger-spring to correct the torsiversion of the first incisor and also employed a silk ligature to rotate the tooth. The main portion of the lingual body wire was soldered to the molar bands with soft solder and as the case progressed this was the weakest part of the appliance.

During the process of treatment the lingual body wire was broken loose from the molar bands on both sides and had to be resoldered. This was because the soft solder does not possess sufficient strength unless used in large quantities, to stand the stress exerted on the lingual body wire from the wire-stretching pliers.

It must also be remembered that lingual body wires are subjected to a certain amount of stress from the force of mastication. Therefore the necessity of using a large amount of soft solder, which tends to make more of a bulky appliance than when iridio-platinum and hard solder is used.

The finger-spring which was used to press against the distolingual angle of the first incisor was also made of nickel silver of 21-gauge. This was likewise soldered to the body wire by soft solder. In order to assure the rigid attachment of the finger-spring, the end of the finger-spring had to be bent in the form of a loop or twisted around the body wire, so the soft solder only acts as a means of preventing it from slipping on the lingual body wire.

*A case report from the clinic of The Dewey School of Orthodontia, Postgraduate Department of the College of Dental and Oral Surgery.

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If the end of the 21-gauge nickel silver finger-spring is not wrapped around the body wire, the soft solder will not be sufficiently strong to hold it in position. This finger-spring can also be attached by placing the end that is to be soldered to the body wire in its proper position, and then wrapping a fine brass wire ligature around the finger-spring and body wire, or taking a piece of thin narrow band material and wrapping it around the finger-spring and body wire, or by using a thin copper strip as a means of wrapping the two together as suggested by Dr. Jackson, and then soldering same with soft solder.

The thing to be remembered in this attachment of the nickel silver finger-spring to the nickel silver body wire, is, that some mechanical means besides the soft solder must be employed to insure the finger-spring's proper stability. In the region of the right second incisor, in Fig. 1, is seen a spur which is soldered to the lingual base wire for the purpose of controlling the direction in which the silk ligature pulls.

The silk ligature was looped around the incisor to produce rotation,

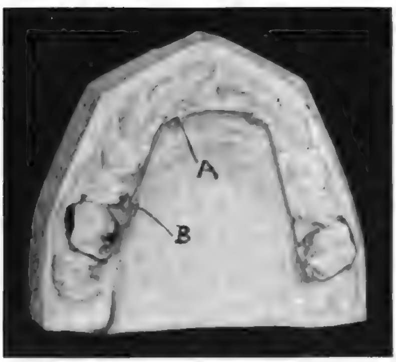

Fig. 1.—Appliance constructed from nickel silver and soft solder. Note finger-spring against first incisor. *A*, spur to control direction of pull of the silk ligature. *B*, spur around which ligature was tied.

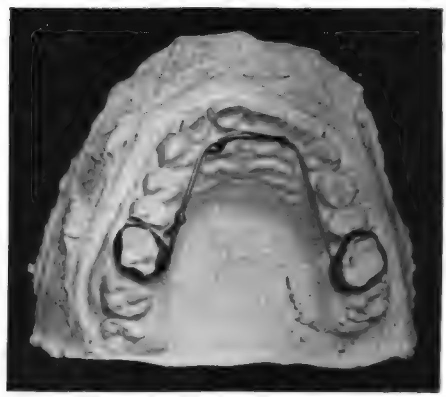

Fig. 2.—Cast made from modeling compound impression showing result of treatment.

and then brought back beneath the spur that is soldered to the lingual base-wire in the region of the second incisor. This spur holds the ligature near the dental arch and prevents it from occupying a position in the roof of the mouth. The end is tied around the spur which is soldered to the lingual base wire in the region of the second premolar. The reason for using a long wire ligature is that the greater the length of the silk ligature the greater will be the contraction.

The spurs which are soldered to the lingual base-wire must also be reinforced before they are attached, after some of the plans suggested for the reinforcements of the finger-springs.

In the first construction of the appliance, these spurs for the attachment of the silk ligature were not reinforced, and they also pulled off in the progress of treatment. It will be noticed in comparing the spur in the region of the second premolar as illustrated in Figs. 1 and 2 that the spur in Fig.

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2 shows a greater bulk of solder which was made necessary by the fact that the end of the spur had been wrapped around the base wire and then the solder flowed over it.

Fig. 2 is made from a modelling compound impression of the case, at the time a retaining band was placed on the maxillary incisor. No attempt was made to correct any of the other teeth, or even correct the torsiversion of the first premolar because the premolar had been worn by mastication to fit in the malposition.

It is our belief that in clinic cases where a fee cannot be obtained sufficiently to cover the use of iridio-platinum, that very satisfactory results can be accomplished with the nickel silver alignment wire, used after the manner suggested by Dr. Anema which technic was practically the same as was employed in this case. However, owing to the fact that when iridio-platinum base-wires and bands, and hard solder is used a more delicate appliance can be constructed, these metals will have the preference in those cases that can afford to pay for the better appliances.

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DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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SALIVARY CALCULUS OF THE SUBMAXILLARY AND SUBLINGUAL GLANDS*

By Leo Winter, New York City

Clinical Professor of Oral Surgery and Diseases of the Mouth, New York College of Dentistry.

DUE to the fact that the textbooks on oral surgery practically ignore this disease it would appear that this condition was comparatively rare. However, a study of the literature shows that about 300 cases have been reported to date. Having seen four cases within the last year, the writer has felt that perhaps it is, in reality, not so rare, but that cases have not been recognized. One interesting feature of all the cases reported is the fact that not one of the cases, even those reported as recent as 1921, was radiographed to aid or confirm the diagnosis. Dr. Alexandre of Paris, reports a case, where the gland was removed for persistent swellings and upon section was found to contain a stone.

CALCULUS IN THE SUBLINGUAL GLANDS

Case 1.—A young lady, twenty years of age, was referred by her dentist for relief of an abscess in the floor of her mouth. Patient had a lower left abscessed lateral incisor extracted two weeks previously, and her symptoms subsided. Twelve days later, a swelling appeared in the floor of her mouth on the right side, which appeared to be increasing in size and giving her excruciating pains. Digital palpation revealed a hard mass. A longitudinal incision was made over this area and the stone practically popped out.

Case 2.—Student at the New York College of Dentistry complained of periodic swellings in floor of mouth. Under local anesthesia an incision was made and the stone felt beneath the knife and readily removed.

Case 3.—Mr. B., an editor, 34 years of age, complained of constant soreness in the floor of his mouth and occasional discharge of pus covering a period of three years. Examination of the floor of the mouth failed to dis-

*Read before the Harlem Dental Society, October 29, 1922.

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close any appreciable swelling or hardness. Radiograms were taken for the purpose of eliminating the teeth as a causative factor, with the result shown in Fig. 1. Under novocaine anesthesia a transverse incision was made, and the stone removed without any difficulty.

Case 4.—The history of this case is unusually interesting for it shows that through lack of resorting to a radiographic diagnosis, the patient suffered for a period of seven years and underwent several operations for the clearing up of an obscure condition. The patient, a man of 32 years of age, a wholesale butcher by trade, noticed about seven years ago the beginning of a swelling under the jaw, accompanied with pain. He went to a physician, who examined the swelling and advised an operation. This the patient submitted to, and, aside from some postoperative pain, felt entirely relieved for about a year. The swelling reappeared, and he returned to his physician, who operated again, and advised him that something was removed; the exact nature of the substance the patient did not know. Subsequently two other operations were performed. The results, however, were negative and the patient was advised that he would probably have to resort to an

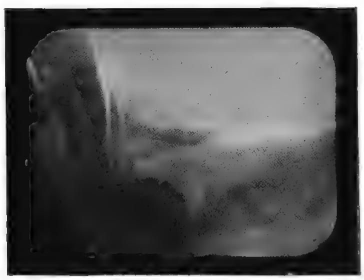

Fig. 1.

external operation for the removal of the gland, but before doing this it would be wise to eliminate the teeth. The patient was referred to the Oral Surgery Clinic of the New York College of Dentistry on July 10. Physical examination showed large swelling under the jaw and a profuse discharge of pus into the floor of the mouth, upon the slightest pressure externally. Radiograms were taken with the results as shown in Fig. 2. Under novocaine anesthesia the sinus was dilated and an attempt was made to remove the stones. The stones appeared to be quite deep, and the writer feared of pushing them in further, so the attempt was abandoned. The wound was irrigated with a weak iodine solution for 10 days at which time one stone came to the surface and was removed with a pair of thumb forceps. A week later pains and swelling appeared again and another radiogram was taken (Fig. 3). The area was anesthetized and the sinus distended, and the second stone removed by means of a Bogle curette. Fig. 4 shows the size of both stones. Aside from a slight postoperative edema for a few days the patient's symptoms have all disappeared, and he has made an uneventful recovery.

Remarks.—There appears to be nothing in the history of these cases to point to an etiologic factor.

Salivary calculi are composed of either organic or inorganic matter.

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The inorganic consists of phosphate and carbonate of lime, potash and magnesium. The organic consists of bacteria and epithelial debris. More than

Fig. 2

Fig. 3.

half of the calculi are said to be found in the submaxillary glands, the balance being about equally divided between the sublingual and parotid.

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According to various authors, calculi occur more frequently in males than in females.

The most common predisposing causes are: the entrance of foreign bodies into the ducts which act as nuclei; and microorganisms around which the salts are deposited.

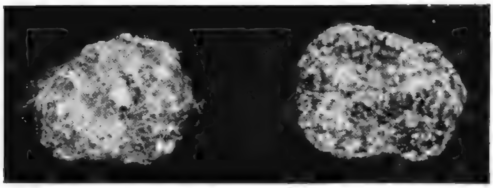

Fig. 4.

In all doubtful cases radiograms should be taken. Great care should be exercised in the taking of these radiograms, so that if calculi are present, they will be easily discerned, and the patient saved the possible annoyance of unnecessary operations, or the worry of a supposed malignant condition.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

RESEARCH PROBLEMS IN ORAL RADIOGRAPHY*

By Clarence O. Simpson, M.D., D.D.S., St. Louis, Mo.

ORAL radiography has developed without special preparation or system, like Topsy "just growed." Individuals have progressed in various phases of the technic and manufacturers have improved the apparatus, but little scientific investigation has been given to perfecting this branch of radiography. It is impracticable for one dependent upon his practice for a livelihood to devote sufficient time to experimental work for the most expeditious and satisfactory results, however great the inclination.

It is proposed that this Society, as one of the objects of its organization, stimulate investigation by selecting a research committee, or submitting these problems to volunteers for a report at the next annual meeting. If at that time the report is incomplete, the work may be continued, but ultimately the solution of the problems directly related with our specialty will be recorded.

An illustrious example of this method of study is furnished by the National Society of Denture Prosthetists. Only a few years ago all dentists were supposedly proficient in artificial denture construction. It was a qualification assumed coincident with the receipt of a diploma. Some had a little more luck than others and a better reputation among the "china" wearers, but all dentists supplied "plates" without reservation or apology. When the members of the Prosthetic Society began to concentrate on the various steps of denture construction we learned that it was a most scientific and complicated procedure, and they have not yet agreed upon some points. However, they have corrected many of their former mistakes and revolutionized the standard of practice. It is a reasonable assumption that similar progress is attainable in radiodontia, and ten years hence we may view the present as a ridiculously undeveloped period of its development.

*Read before the American Society of Dental Radiographers at Los Angeles, Cal., July 19, 1922.

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MILLIAMPERAGE

What is the most desirable milliamperage for intraoral radiography? This is an interesting question, and possibly one of real importance. The generally accepted technic is the use of 20 ma., but who can say it is correct? It is used and recommended because it gives reasonably satisfactory results, and is well within tube capacity. It may be correct, but since such arbitrary conclusions are usually erroneous, probably it is subject to advantageous modification. The milliamperage which will produce the best results under working conditions should be determined by careful experiments.

The length of exposure is related, but not in exact inverse ratio, to the milliamperes passing through the tube. If the objections do not exceed the advantages, it is desirable to reduce the exposure time to the minimum to avoid movement of the patient and vibration of the equipment. If you are using 20 ma. with an average exposure of 7 seconds, you may shorten your average exposure to 4 to 5 seconds by raising the amperage to 35 ma., which is not an excessive overload for a tube. Here another factor is injected—the size of the focal spot. Definition is improved by a finer focus of the cathode stream, but the size of the focal spot limits the quantity of current which may be used without fusing the target. Which will produce the best results at a long target-film distance, 10 ma. with a focal spot 1 mm. in diameter, 20 ma. with a focal spot 3 mm. in diameter, or 35 ma. with a 5 mm. focus?

TARGET-FILM DISTANCE

The relative advantages of different target-film distance is a debatable point, but why should not the correct distance for the tube in intraoral radiography be ascertained by scientific experiment? Most of us are working at a distance arbitrarily fixed by the capacity of the apparatus, the length of the cones used, or a preconceived idea. In the extremes are those who advocate a target-film distance of 3 or 4 feet, and the 8 inch distance which is the compensating factor for low voltage with the small type machines.

The theory advanced by McCormick that an extremely long distance eliminated the malar shadow by perspective is a fallacy, but on the other hand the distortion of an excessively short distance is glaringly apparent. The "inverse square" law of intensity requires the exposure to conform to an increased distance, and with a lengthened exposure other difficulties arise. Definition is improved and the objection to a large focal spot is reduced by increasing the distance, but other factors must be considered. In view of the relative length of exposure, what is the best target-film distance for intraoral radiography?

FILTERS FOR DENTAL RADIOGRAPHY

Most dental radiographic equipment is supplied with filters of aluminum or bakelite, which are featured as a safety factor in operation. Materials used as filters absorb the softer rays, and are necessary for protection of the skin in the prolonged exposures for deep therapy. The soft rays have a greater actinic action on photographic emulsion than hard rays, so when a

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filter is employed in radiography it must be compensated for in the exposure. The short distance between the skin and the film in intraoral radiography leaves little difference in the skin dose and the photographic effect. The skin exposure must be sufficiently great to permit of the desired radiographic action on the emulsion.

Atmosphere acts as a filter for x-rays, and increasing the distance of the tube from the patient may be made to serve the same purpose as interposing filter material. With suitable voltage, are filters a protection to the patient, and do they improve or detract from the radiographic results?

SECONDARY RADIATION

One of the most serious handicaps in radiography is secondary or scattered radiation. If it were possible to eliminate secondary rays, negatives of startling brilliancy and definition could be produced. Flesh and bone are especially active in the production of secondary rays, and the detail and contrast of radiodontic records are probably impaired 25 per cent by this action. The weak rays coming from all directions impart a lower tone to the negative similar to light or chemical fog, and tend to carry the highlights into the shadows.

When striving for additional information from radiodontic examinations in the study of early pathologic changes, every distinction in structural density must be obtained. Doubtless you have seen the wonderful improvement resulting from use of the Bucky-Potter diaphragm in general radiography and fluoroscopy. This method is not applicable to intraoral examinations, but the example should stimulate search for a means to accomplish the end. Why not have this advance originating from this Society instead of a commercial source?

RADIOTHERAPY IN DENTISTRY

What are the benefits to be derived from x-ray therapy in dental practice, and what are the safeguards, technic and comparative results? The therapeutic value of x-rays has been demonstrated in the treatment of many conditions, and there are dental pathologic manifestations which respond indifferently to the methods of treatment in vogue. Medication, ionization and surgery are employed for treatment of periapical infections, perhaps x-radiation would prove more efficacious. It is possible that x-rays will inhibit dental caries, and the prevalence and ravages warrant a test. Some empirical cures of pyorrhea alveolaris by radiation have been reported, but the technic has not been perfected or the value of the treatment established. May not this Society have for a worthy object, the proof of whether or not x-ray therapy is useful in dentistry?

ECONOMICS

Although not a scientific problem, but appropriately after mechanics, science and service, the last point for your consideration is the economics of radiodontic practice.

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The different scales of fees for radiodontic services, usually associated with varying character of service, suggest a careful survey of the elements involved. Other dental operations have been repeatedly analyzed by investigators in presenting economic principles to the profession, but radiodontia has followed false standards.

In the earlier days of radiography the fee for radiographing the teeth was fixed at $75.00 by a representative organization, while now it is advertised for $5.00. Assuming the service in each instance to be of equal inadequacy, there is a great discrepancy in the fees.

The essential requirements of a radiodontic examination can be stated with precision, the time and labor required for a thorough examination is fairly uniform, and the cost of production, overhead and supplies, does not appreciably vary in different localities. From this data a basis for compensation may be calculated. The present economic standards of radiodontia are chaotic, as those of general dentistry were before an analysis, and when this question is settled the commercial aspect can be subordinated.

The plan which favors the most satisfactory solution of these problems should be put in operation. Committee action is notoriously inefficient in depending upon the energy of the chairman, so this work may remain dormant if referred to a committee. The attendance of members at this meeting is not large enough to hope for the questions to be allotted to volunteers, but the records will be available when the Society is in a position to act in the matter.

DISCUSSION

Dr. De Los L. Hill.—Mr. Chairman, I don't want to let this paper go by without any discussion, as there is so much in it. I understand from Dr. Simpson's paper that he wishes us to discuss the factors, and overcome any problems that may arise, so that we may arrive at one thing—a definite technic. That at least has some bearing on the subject, hasn't it, Dr. Simpson?

Dr. Simpson.—Yes.

Dr. Hill.—If we ever expect to reduce radiography or roentgenology to the scientific basis to which it is really entitled, we must develop an absolute definite technic, so that results that are obtained today can be reproduced tomorrow. If we don't do that, we are falling short of our mark. Now, there are several points that enter into what might be called a definite technic that are minor matters to which Dr. Simpson referred, but which it is well to take cognizance of if you wish to obtain results. If you are making a denture (as has been referred to by Dr. McAlpin), if you make a denture today and over a period of two or three days you make a denture for that same mouth, you would naturally expect to get one the exact reproduction of the other. Unless we establish a definite way of taking all of our radiograms, you can take one picture today and attempt to duplicate it tomorrow, but when you analyze it, so to speak, there are differences that you yourself will discern, and if you don't other diagnosticians will point them out for you. There are several points that I would like to submit right along that line. One is the position of the patient, the focus of the tube, the distance which Dr. Simpson has touched on, your milliamperage which he has also touched on, the time of exposure; and two essential points, if you are going to get definite results are your development and the temperature of your developing solution. The best way to get definite information along those lines and see what differences—or at least I have found it so—can exist in the same patient at the same time, is to take radiograms made under different conditions as

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far as milliamperage, time of exposure, temperature of development and time of development are concerned. If you gentlemen will make up a series of radiograms of any one patient, all made at the same time and same location with an exposure of one-half second and varying subsequent exposures one-half second up to five seconds, using the same distance, the same temperature of developing solution, the same time for development, and compare them, you will see the difference. If you make up another series, all the other factors being the same, but varying the temperature of your developing solution from 60 degrees up to 90 degrees, you will notice a vast difference. Now, do the same thing with the time development, all other factors being equal, and vary your time of development. If you wish to use five minutes as a basis of development, all good and well. Vary the development of those radiograms from one minute to five minutes and then on up to seven or eight minutes and see the difference. Then you are able to ascertain at what point you get the best results. Now I respectfully submit that while there may be a basis for doing work of this character that is generally recognized, or may be recognized by this body as being the best basis on which that work can be done, yet one man will get results under those conditions, while another will get better results under other conditions, due to factors that are not taken into consideration. The less we can vary our technic on taking radiograms, the better off we are. Why not have a definite technic, for instance, as to position, as to focus, and as to distance, as to milliamperage, as to the time of development, as to the temperature of development, and vary, first our time of exposure and then other factors if necessary. The point I especially wish to bring out is to get a definite technic in taking our radiograms, and vary, if possible, only one of those factors. Then if we do not get the desired results we will know where the trouble lies. Everything else being equal, it can only be in the one factor which we vary.

Dr. Simpson calls attention to an 8-inch distance, but said afterwards that he preferred to use an 18-inch distance—I think that is right, Doctor—correct me if I misquote you. I don't believe it is advisable, unless it is in the hands of an experienced technician to allow your tube or the target of your tube to come within 8 inches of your patient. As far as I know, we have no recognized authority who would give us that distance to work on. Probably, for the same reasons that Dr. Simpson brings out, for a number of years I have used the 18-inch distance as a basis. Now, we have to vary that because in certain positions, in taking intraoral radiograms we cannot get exactly 18 inches. Very frankly I don't measure my distance, and I doubt if Dr. Simpson measures his. We get accustomed to looking at the part to be radiographed and the tube, and we know approximately what it is, and when I say I use 18 inches I mean I use that as a basis. I may vary it two or three inches, but as a rule it will be less than 18 inches rather than more than 18 inches. I would like to ask the doctor what is his authority for making the statement that secondary radiation detracts 25 per cent from his radiograms. Why didn't he say 20 per cent, or 30 per cent? My experience has been that it is vastly different under different conditions, and I am asking that question for information.

On the economic side of the question I fear that we are liable to carry the economic side of radiography a little bit too far. There is not any question but than an x-ray machine is an economic product in your office—to use the plain, every day parlance, you make money with an x-ray machine, there is not any question in the world about that—but it depends on conditions under which the x-ray work is done, for whom it is done, the character of the patient—everything has to be taken into consideration. If one of my patients comes to take x-rays for a diagnostic purpose I charge him for that diagnosis absolutely separately from other operations. The x-ray work or the radiograms are only a means to the end of that diagnosis. While they may be the basis for the facts upon which I base my diagnosis, it is simply a means by which I can make it. I don't charge directly or place a fee for the radiograms that I take, but my fee is for my ability to render an intelligent diagnosis of the conditions that I find to exist in the patient's mouth. My x-ray machine is a part of my equipment just like my engine, and everything else that goes into the making up of a dental office, and I don't feel like it is placing our profession on the right basis, to make a definite charge for an x-ray. It is just like the drummer's

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overcoat—it is on the bill but it doesn't show. It is part of the work, and I think that we are lowering the standard of our profession when we make a definite charge for an x-ray whether it is for our patient or a referred case. If it is a referred case, then it is not for the x-ray work, but it is for the diagnosis and the professional opinion that we offer on the condition of the oral cavity of that particular patient. If I may be allowed to just mention Dr. McAlpin's point which he brought out—I don't know whether it is primarily correct or not.

I will say, if you will allow it, that the students in our college in Atlanta, Dr. McAlpin, receive thirty-two hours of technical work on the subject of roentgenology that is entirely separate and distinct from their laboratory work, and their laboratory work varies. They must do a certain amount of laboratory work, but they must be able to turn out a certain class of radiographic work just as they turn out a certain class of prosthetic work, if you please, or just as they turn out a certain class of operative work and they must stay on that line of work until they are able to do it properly. That particular work is passed on by the chair of Roentgenology, just the same as the other subjects are passed on, and I just thought I would mention that for your information.

Dr. Lynn.—I would like to ask Dr. Simpson what his personal experience is with the sheet of metal that is used for absorbing the secondary rays.

Dr. Simpson.—The reason, Dr. Hill, that development was not considered as one of the problems was because it is a chemical process which has been thoroughly investigated by manufacturers. We can depend upon the findings of the research laboratory of the Eastman Kodak Company for our technic and conclusions in the photographic end of it. There is no question about its importance, but it no longer constituted a problem. I intended to state that probably 25 per cent of impairment was the result of secondary radiation, I certainly do not know how much, but by comparison to what general radiography has accomplished in using the Bucky-Potter diaphragm secondary radiation is a confusing element in our work. The economic problem presented was not for consideration as the determining factor in fees by any means. For example, a patient may be referred to you and you will make what would be termed in different language a general x-ray examination of the mouth and render an opinion and make the charge. Another patient may be sent to another operator, particularly a commercial laboratory, and they will give what they claim is the same service for a fee for which a professional man cannot afford to work. From this condition particularly the general practitioners of dentistry have had their fees for this radio-diagnostic work driven down and down. There is no competition between a mechanical operation and a professional service, but it has resulted in forcing down the fees for radio-diagnosis until it is difficult in many communities for a dentist or a radiodontist to get compensation for this service. The best way to combat it, is for this society to determine cost of production for a fee basis. You asked for a personal opinion on the filters, Dr. Lynn. If I had reached a conclusion I would have done it by experiments and would give you the results instead of the problem. I can tell you what I use and why, but it is not for you to accept. I use one-tenth of a millimeter of aluminum for a filter which is about the efficiency of a piece of cardboard, and do not consider it a safety factor in the least. It is used to filter out the scattered radiation arising from the glass of the tube. When the primary rays strike the tube they produce secondary radiation and I feel that this filter may reduce that. Apparently there is no difference in the results without the filter and with one millimeter of aluminum except the time of exposure is increased about 10 per cent. If it does nothing else than to increase our exposure it is objectionable, and that is the reason the question should be decided on a scientific basis instead of on a hunch basis. I have done most of my work without a filter and I have only recently added a filter as an experiment, working along the line that I have suggested here.

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RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Who's Who?

Q.—Can you recommend a good dentist in ——— for a family from my practice who is locating there? They are appreciative patients who can well afford to pay for proper service, and I want to refer them to the right man.

A.—Inquiries of this nature are so frequently received that they deserve attention and comment. Why should you ask advice about a competent dentist in a city like ———? Is there not a dental college there with a faculty composed of prominent men, whose names, affiliations, and previous conditions of servitude are spread upon the pages of Polk's antiquated directory? Does not that city have a chronic committeeman in the American Dental Association who by swapping invitations appears on every program of the Association? Are not all duly degreed and licensed dentists competent?

Oh! horrors! you must not forget your code of ethics. You reply that many of those faculty men do not practice what they expound, because you have seen the results of their operations. That there is more politics than science in the American Dental Association, and you have to attend state and local meetings to hear the men who are advancing dentistry. That you have met some good fellows from that city, but there is a distinction and difference between vocalists and instrumentalists. You state that the proportion of competent men in any profession is small, and dentists are born, not made.

Your statements are convincing, and, perhaps it would be difficult to disprove them. Without discussing the reason, it is true that superior dental operations are sufficiently rare to cause comment when seen. With due consideration and fairness, the chance of your patients' obtaining the character of service which you specify on the recommendation of a lay friend—or even a lady friend—is remote.

A lack of definite information about the relative skill of the dentists in the city mentioned prevents making the recommendation which you solicit, but here is a substitute suggestion which will satisfactorily serve in this and similar contingencies. Give your patients a letter of introduction to Dr. ———, a radiodontist, requesting him to refer them to the proper men for the attention required. This offers the best plan for placing patients in the care of honest, skillful dentists in other cities. A radiodontic practice is the clearing house, the observation post of dentistry in any city, and a radiodontist

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deserving of the name is qualified to advise your patients and is actuated by altruistic motives in complying with your request.

Some dentists believe that radiodontists are hypercritical and prone to condemn operations, while to the contrary a radiodontist with extensive experience in general practice is charitable to a fault. He is familiar with the negligence, procrastination, and lack of cooperation of patients, he appreciates the exasperations and exacting technic of dental operations, and is ever ready to condone errors of commission, or to commend conscientious efforts. It is the lazy, dishonest, yea criminal operations, the suffering and disability of innocent victims which is the festering thorn in his flesh and the fermenting bacilli in his milk of professional loyalty.

In the line of duty the radiodontist is an avenging angel and an agent of justice in a community. He does not condemn operations or criticise operators, but merely portrays existing conditions and in so doing ultimately segregates the goats from the flock, hoists the transgressor by his own petard, and shoos chickens homeward to an uncongenial roost for a self-respecting fowl. The x-ray is the revealing power which has revolutionized dentistry; the radiodontist only the medium.

While you now find radiodontists only in the larger cities, there will be at least one in every small city when the x-ray is used for oral diagnosis as generally as indicated and the novelty of amateur radiography palls on the dentist. If a radiodontist is not available, refer your patients to a periodontist for advice about dental service. In the practice of tooth skinning and periodontal gardening, one must be continually harassed by the results of diagnostic negligence, operative blundering, and protected quackery. Imagine the diplomacy required, and the discouragement encountered by a periodontist with ideals.

The exodontists, splendid, courageous fellows though they are, may be too intent upon destruction to discriminate in constructionists. There are many essential destructive vocations, wreckers, soldiers, executioners—and exodontists; but if you were looking for a good physician you would not inquire of an undertaker.

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ABSTRACT OF
CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Teeth of the Tuberculous. T. W. Power (New Haven). The Dental Cosmos, October, 1922, lxiv, 10.

This subject cannot be decided offhand by a few generalizations, but undoubtedly the teeth of the tuberculous show a tendency to certain peculiarities. The author has functioned as dentist to five tuberculosis sanatoria and his teachings are therefore based on extensive personal experience. In children there is a good deal of caries of the deciduous teeth, so that rows of roots may alone remain. There is also a notable tendency to defective enamel formation. This shows a primary metabolic disturbance. The relations of the disease in question to the state of the teeth are of course complicated. We do not know whether the caries is a cause or effect of the undernourishment and lowered resistance. Some of these children are not actually tuberculous, but are merely suspects. Hence it may be more satisfactory to study the adult tuberculous subject. Caries and pyorrhea are both highly prevalent and contrary to much teaching they frequently coexist in the same subject. The author has extracted over 1000 teeth annually for these two affections. In 50 per cent of caries the latter extends to the pulp with moist or dry necrosis. Some patients show as many as 20 of these teeth. Pyorrhea and gingivitis are extremely common with both salivary and serumal calculus, although the latter predominates greatly. This condition of the teeth may plausibly be attributed in part to the pulpy character of the food, which gives the teeth no exercise. Thus they get a little tender beef when perhaps they would thrive better in the long run on round steak, which requires much mastication.

The Ear, Nose and Throat Man and the Dentist. W. T. Patton (New Orleans). The Dental Cosmos, October, 1922, lxiv, 10.

The dentist can enlighten his ear, nose and throat colleague on four subjects, viz.: focal infection, headaches and neuralgias, antral disease and orthodontia. Patients are sometimes sent to the laryngo-rhinologist to ascertain whether there are foci of infection in the upper air and food passages; and while it is often possible to make a positive report it is never safe to make a negative one if the parts appear to be sound. Innocent looking tonsils

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may harbor pus pockets and this is true also of the nasal sinuses. The dentist is considerably better off in regard to accuracy, for his x-ray plates give him positive and negative information alike. There is a dispute as to whether the antrum belongs primarily to the dentist or rhinologist, but the author believes naturally that primarily it belongs to the latter, while the dentists are concerned with it only incidentally, as when an infected root extends into the sinus. In about 30 per cent of antral disease the teeth are responsible, hence it is the custom of the rhinologist to invoke the aid of the dentist in the obvious dental case as well as in the obscure case in which no cause is apparent. The interest of the rhinologist in orthodontia arises from the common occurrence of deflected septum and high vaulted palate. If the child is young enough the dentist can prevent or overcome this state of affairs by orthodontic broadening of the dental arch. The same patient seen later may obtain relief only from an intranasal intervention.

The Effects of the X-Rays and Radium on the Blood and General Health of Radiologists. G. F. Pfahler (Philadelphia). American Journal of Roentgenography, October, 1922, ix, 10.

The report of five deaths from exposure to radiation of one or the other type from aplastic anemia is of deep personal interest to every radiologist, even though there is some doubt of the responsibility of the rays in some or all of such cases. It is significant that some insurance companies decline to insure radiologists as extra-hazardous risks, although the warrant for so doing is founded on early cases in which protection was not understood or properly applied. Considering the vast amount of life saved through the radiologist, the insurance people can well afford to exempt the latter. Next to aplastic anemia the danger to operator is found in a certain liability to develop malignant disease, but the danger of this should have passed with modern protection. There have been three deaths in the London Radium Institute since its foundation in 1916, but of this number only one could be said to have occurred from a possible occupation disease—anemia (pernicious). The other patients died of infectious endocarditis and pneumonia respectively, under circumstances which made it credible that their resistance had been lowered through constant exposure to the rays. Of late it has been assumed that the radium worker is the only one endangered at the present day, but recently Larkin reported a death from anemia in a veteran radiographer, who continued to work long after his blood was badly affected. This case was duplicated in Dr. Treboschi, an Italian. The five cases mentioned at the beginning of the article comprise the three in the Radium Institute—for all three patients were notably anemic—the case reported by Larkin, and that of the Italian, both the latter victims, as already stated, having been exposed for many years to the x-rays.

Many blood studies have been made on workers, especially by Mottram of the London Radium Institute, the latter in both radium workers and radiographers, also in normal controls. The best control, however, was the use of protective measures in association with the daily blood counts which made

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it possible to carry protection to a fine point and also to spare the worker unnecessary handicaps. In addition, considerable work has been done on animals. Since November, 1921, at the author's instigation members of the Philadelphia Roentgen Society have been making blood examinations on themselves and their fellows, and in addition an attempt was made to control the blood of all the radiologists in America through circular appeal. One thousand blanks brought 338 replies, showing a certain amount of apathy. It was ascertained incidentally that the general health of radiologists was above average and it may or may not be significant that in the year of the influenza pandemic the entire staff of one of the radium producing companies were immune. Undue exposure to either rays or radium is known to induce leucopenia at times, with other anomalies of the blood count, while low blood pressure—uncomplicated—is quite common. Asthenia may be due when present to long and arduous work, which is necessary to offset the heavy overhead charges of operation. Cutaneous lesions are entirely avoidable; complete protection is feasible and necessary to those who work with gamma rays. A dental film carried in the pocket will give a measure of excessive exposure, for it should not fog or blacken under ordinary exposure. Shorter hours and outdoor recreation are recommended.

Etiology of Alveolar Pyorrhea. J. Bodo (Blumenfeld). Vierteljahresschrift fur Zahnheilkunde, 1922, xxxviii, i.

The author reviews the entire subject, quoting mostly continental writers. The calculus theory may be disregarded, as calculus without pyorrhea is common. The infection theory is largely dependent on the supposed cooperation of callus with infection of various types, but there may be a high degree of pyorrhea without any evidence of inflammation. Again there may be intense suppurative gingivitis with escape of pus from beneath the gum, yet it may end in complete resolution. The spirochete theory, which originated during the war, was of short duration and is no longer mentioned. The theory of Gottlieb merits attention. His studies convinced him that pyorrhea has its début in a primary atrophy of the alveolus. Physiologic atrophy is normally made good by a new formation of bone and when the latter fails to appear the atrophy virtually becomes pathologic. However, right or wrong, we do not know the causal factors of this failure of osesous new formation. The writer, however, disputes this mechanism. He has since 1909 held publicly that the lateral lever-like pressure upon the teeth is the cause of the affection. Moreover there may be pyorrhea without any atrophy at all. Weski has recently claimed that Gottlieb's physiologic atrophy is a myth. The author will cover his theory of lateral pressure in a special forthcoming article.

Alveolar Necrosis from Mercurial Intoxication. O. Schneider (Munich). Zahnaerztliche Rundschau, October 17, 1922, xxxi, 41.

In 1917 the author had charge of a severe case of unilateral necrosis of the mandible, the mercury having been taken internally. Cases of this sort

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are not so rare when the drug has been injected, but the present example is of a much more infrequent type. The patient was a servant girl, aged 21, who had attempted suicide by swallowing a solution of sublimate. Her stomach was at once washed out and she was taken to the hospital for treatment. For several weeks she presented active symptoms of poisoning, including evidences of nephritis, but gradually improved in all directions, with the exception of a gingivitis which was of late appearance—two weeks after swallowing the poison. Under proper management this slowly improved, but the teeth were found to be loose in the left mandible. Eight weeks after the suicidal effort she first came under the care of the dentist who found the teeth mostly well articulated, and no gingivitis, but the left lower alveolar process was completely denuded of mucosa from canine to wisdom tooth. A certain amount of pus could be squeezed out. The process showed an abnormal mobility and the teeth in this segment were also loose in their sockets. The x-ray showed a line of separation between the alveolar process and the rest of the mandible. This slough was readily lifted from the mouth with forceps. No more pus formed and the wound closed smoothly. The preference for the left side was due probably to the presence of some roots of teeth in the affected segment.

Causal Relationship Between Dental and Cutaneous Affections. Bodlaender. Zahntechnische Reform, October 22, 1922, xxvi, 42.

The author first mentions the fact that the powdering of ordinary pointed warts sometimes induces the formation of bullae in the skin and mouth. Affections of the teeth sometimes play a rôle in the development of alopecia areata, while conversely the extraction of teeth has sometimes cured the same affection. There is a similar causal association between affected teeth and herpes zoster, nor is the latter to be set down to the arsenic used for the destruction of the nerve. Paradoxical cases of toothache have sometimes terminated in the appearance of groups of zoster vesicles on the gums. In certain cases filling the teeth has been followed by outbreaks of vesicles in the skin, but the connection is not easy to establish. The chemicals used may be accused if these are not commonly employed, and when arsenic has been needed there is often the suspicion of a special sensitiveness to this metal. In rare cases the causal relationship has been demonstrated beyond doubt. In other rare cases sharp fragments of teeth have been responsible for eczema about the lips which have also been compressed between the upper and lower teeth. The use of various drugs for mouth-washing may contribute to the development of these eczemas about the lips. The author discusses in this connection the diseases syphilis, tuberculosis and actinomycosis, but is quite silent as to the possibility of septic roots, etc., causing pyogenic dermatoses by focal infection.

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EDITORIALS

The Taggart Case

AGAIN we think it our duty to call the attention of our readers to some of the conditions which have arisen in the dental profession as a result of the activities of one William G. Taggart in securing patents on certain processes and bringing suit against dentists for the infringement of these patents.

So far as we know, three different suits have been filed by Taggart in the past, to substantiate the aforementioned process patents. The first suit, filed in Washington, was won by Taggart and reversed in the higher court. The second suit filed by Taggart was against a dentist in Chicago. This was also won by Taggart. After the winning of the first suit in Chicago, Taggart brought into count a large number of men in Chicago, which suits caused the formation of the Dentists' Mutual Protective Alliance, for the purpose of defending the dentists sued under the Taggart patents. As the result of

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this legal contest, the Dentists' Mutual Protective Alliance spent over forty-one thousand ($41,000) dollars for the purpose of proving the Taggart patents invalid, and thereby saved the dental profession several millions of dollars during the last few years. The case was decided against Taggart in the District Court of the United States for the Northern District of Illinois, Eastern Division. Taggart carried the case to the United States Circuit Court of Appeals where it lay for some time.

However, in spite of all the legal obstacles which Taggart's attorneys could use to prevent the case from coming up for final review, it was decided in September. Taggart lost on every count with the exception that his patent on his casting machine was held valid. The United States Circuit Court clearly brought out, as did the lower court decision, that the real inventor of the inlay was Dr. B. F. Philbrook, a dentist living, at the time he invented the inlay, in Dennison, Iowa. We believe Dr. Philbrook is at the present time practicing in Sioux City, Iowa.

There is one phase of the Taggart case that impresses itself very clearly upon our memory; that is, the wining and dining of Taggart, at the time he presented his claim of having invented the inlay, to the dental profession. Several men immediately came forth as active press agents and claimed he (Taggart) was the savior of the dental profession; but in a short time, it was proved that instead of Taggart's giving the dental profession anything, he was a smooth salesman using the dental profession as an advertising medium for the selling of his products and processes, upon which he had obtained a patent. At the time he brought the first suit in Washington, it was proved that several men had made cast inlays prior to Taggart's application for patents. Evidence also seems to indicate that Taggart was present at one of the meetings where a clinic was given on the cast inlay. Some of the strongest evidence presented in the case at Washington was furnished by Dr. O. H. Simpson of Dodge City, Kansas. At the time Taggart was suing certain members of the Dentists' Mutual Protective Alliance, the alliance found that Dr. Philbrook had preceded Taggart by ten years, and has put and maintained in public use, the same methods of making cast dental inlays. In regard to Philbrook's work, the United States Circuit Court of Appeals has the following to say:

"He prepared the tooth cavity; he caused the walls of the tooth cavity to determine the size and shape of the pattern composed of plastic materials, namely, dental wax; he formed a mold about the wax pattern; he formed a crucible-shaped depression in the mold, he formed a sprue-hole connecting the crucible and the interior of the mold from which he melted out the wax pattern; he melted the inlay metal in the crucible; and by air pressure he forced the molten metal into the hollow." It was this particular finding of the Court that resulted in all of Taggart's claims being decided against him.

One cannot help but notice the difference between the two men, Taggart and Philbrook. Philbrook was over ten years ahead of his time, doing something for the welfare of the dental profession which they did not accept at the time he presented it. However, he was content to let the value of his

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work be decided by the future. He gave freely to the profession of what he had and asked no return whatsoever. Taggart gave nothing and asked for unjust glory and much money. During the past few years the dental profession has honored different men who have contributed to the advancement of dentistry. As we look back over the history of dentistry and review what various men have contributed, we find none have given more to the profession than Dr. Philbrook. The method which he advocated many years ago has now become standard practice. The profession is indebted to him for having carefully preserved records of his work in such a manner as to prove to the Court that Taggart's claims were unjust and thereby Dr. Philbrook has saved the profession millions of dollars which Taggart would have collected as tribute. We believe it is only fair that the American Dental Association take some proper recognition of the work which Dr. Philbrook has done and contributed to the dental profession.

The Systematic Development of X-Ray Plates and Films*

DURING the past few years many books have appeared on the subject of radiography, but probably no work has been so greatly needed as something on the proper development of plates and films. The average man who goes into radiography purchases an outfit suggested to him by some salesman, constructs some kind of a dark room and proceeds to "interpret" radiograms. Consequently, 50 per cent of the important steps in interpreting a radiogram has been overlooked by the fact that the operator does not become familiar with the development of the films from a scientific standpoint.

Many of the unsatisfactory results obtained in radiography can be traced to the improper handling of the films after the exposure. The x-ray outfit and the film have been prepared by the manufacturers and consequently unless seriously tampered with, will give standard results.

After the exposure of the film, it then lies with the operator as to what the result will be. It is the belief of many men that all that is necessary to make a good radiogram is to have a satisfactory radiographic equipment, when, as a matter of fact, more films and plates are probably spoiled in the dark room than anywhere else. The developing of an x-ray plate is a chemical reaction and one of the most sensitive reactions that is known. Not only is the x-ray plate sensitive to lights and chemicals, but temperature also greatly changes results. Added to these three important factors is a fourth condition which is almost universally disregarded, and that is cleanliness. All of these things are carefully described in Dr. Wendell's work on the x-ray plate. Any man who has made radiograms should read the book from beginning to the end, and if he has delegated the developing of radiograms to his assistant he should purchase the book for her. The small amount required to purchase the book will yield many fold in more satisfactory results.

*Systematic Development of X-Ray Plates and Films. By Lehman Wendell, B.S., D.D.S., Chief of Photographic Work, Instructor of Prosthetic and Orthodontia, College of Denistry, University of Minnesota. Price $2.00. C. V. Mosby Company, St. Louis.

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ORTHODONTIC NEWS AND NOTES

Third Annual Session of Southwestern Society of Orthodontists

The Third Annual Session of the Southwestern Society of Orthodontists will be held at the Gunter Hotel, San Antonio, Texas, January 17, 18, 19, and 20, 1923. A cordial invitation is extended to all ethical practitioners interested in orthodontia. The San Antonio Dental Society will hold its midwinter meeting in conjunction with the Orthodontists on the day of the 20.

The following program will be carried out:

WEDNESDAY, JANUARY 17, 1923

10:00 A. M.—Address of Welcome, Dr. S. B. Riggs, San Antonio, Texas.
Response, Dr. T. Walter Sorrels, Oklahoma City, Okla.
President's Address, Dr. W. E. Flesher, Oklahoma City, Okla.

11:00 A. M.—Outline of Proposed Course, Dr. Oren A. Oliver, Nashville, Tenn.

12:00 NOON—Lunch, private room, Gunter Hotel.

1:30 to 3:00 P. M.—Orthodontics, Dr. Oren A. Oliver.

3:00 P. M.—Golf Tournament, 18 Holes Handicap Play, Four Prizes. (All guests eligible.)

THURSDAY, JANUARY 18

9:00 A. M.—Orthodontic Appliances, Dr. Oren A. Oliver.

12:00 NOON—Lunch, private room, Gunter Hotel.

1:30 to 4:30 P. M.—Table Clinics:

(1) A Simple and Accurate Method of Constructing Lingual Appliances by Dr. Edmund Arnold, Houston, Texas.
(2) A Practical Form of Bracket Attachment to Labial Arches, by Dr. O. E. Busby, Dallas, Texas.
(3) A Simple Method of Replacing Missing Anterior Teeth During the Period of Treatment and Retention by Dr. P. G. Spencer, Waco, Texas.
(4) Reducing and Splinting Fractures by Means of the Bracket Band and Ribbon Arch, by Dr. T. O. Gorman, San Antonio.
(5) Dr. T. Wallace Sorrels, Oklahoma City, Okla. (Clinic to Be Announced.)
(6) An Appliance for Expansion Where Extreme Overbite Prevents Use of Lingual Appliances, by Dr. Wm. T. Chapman, El Paso, Texas.
(7) Treatment of a Bilateral Distoclusion Case, Using Soldered Lingual and High Labial Appliances, Dr. W. E. Flesher, Oklahoma City, Okla.
(8) Appliances for Treating Very Young Patients, Dr. A. B. Conley, Dallas, Texas.
(9) Maxilla Development from Orthopedic Stimulation, Dr. T. M. Robertson, Coffeyville, Kansas.
(10) Aderer Clutch Lock Used with Angle Ribbon Arch, by Dr. E. E. Moore, Fort Worth, Texas.
(11) By Dr. Wm. B. Stevenson, Amarillo. (Clinic to be announced.)

FRIDAY, JANUARY 19

9:00 A. M.—Orthodontic Treatment, Dr. Oren A. Oliver.

12:00 NOON.—Lunch, private room, Gunter Hotel.

1:00 to 2:30 P. M.—Orthodontic Technic, Dr. Oren A. Oliver.

2:30 P. M.—Paper, Some Phases of Distoclusion, by Dr. T. G. Duckworth, San Antonio, Texas.
Paper, Service and Compensation, by Dr. Hugh G. Tanzey, Kansas City, Mo.

4:00 P. M.—Summary of Technic, Clinics and Papers, by Dr. Oren A. Oliver. Presenting of Models, Radiograms of our Troublesome Cases, etc., for general discussion.

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SATURDAY, JANUARY 20

9:00 to 10:00 A. M.—Business session, election of new members, election of officers, discussion of President's Address, selection of place of 1924 meeting.

10:00 A. M. to 12 NOON—Tour of city, visiting all of the points of historic interest in and about San Antonio.

12:00 NOON—Lunch, private room, Gunter Hotel.

2:00 P. M.—Mid-winter Meeting of the San Antonio Dental Society.

7:00 P. M.—Banquet, Gunter Hotel.

Items of Interest

Dr. Zenas T. Roberts announces the removal of his dental offices from Rocky Ford, Colorado, to 624-625 Majestic Building, Denver.

Dr. Geo. F. Seeman announces the removal of his office to 447-449 Lambuth Building, Nashville, Tenn.

Dr. Hubert T. Gosney announces the opening of his office, Suite 220 Franklin Bldg., 301 East Franklin St., Richmond, Va. Practice limited to orthodontia.

Dr. Otto J. Monson, orthodontist, announces the removal of his office to 321 Junipher Bldg., Third Street and Santa Monica Blvd., Santa Monica, Calif.

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